# Mac Studio (2022)

## Repair Manual

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# Introduction

This manual includes technical instructions for replacing genuine Apple parts in Mac and is intended for individual technicians with the knowledge, experience, and tools required to repair electronic devices.

**Important**

- Read the entire manual first. If you're not comfortable performing the repairs as instructed in this manual, don't proceed.
- Always use the latest version of this document available at support.apple.com/en_US/manuals/macdesktops.

**Warning**

Failure to follow the repair instructions or to use genuine Apple parts or proper tools may cause electric shock or other safety issues and lead to personal injury or death.

**Caution**

Failure to follow the repair instructions or to use genuine Apple parts or proper tools may damage the Mac, parts, or other property, or compromise the device's functionality.

## Warranty information

Damage caused by repairs performed outside of Apple or the Apple Authorized Service Provider network is not covered by Apple's warranty or AppleCare plans. Such damage may cause future repairs to be subject to out-of-warranty costs or render the device ineligible for future repairs by Apple or Apple Authorized Service Providers.

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## Tools and parts

### Ordering tools and parts

You can learn how to order genuine Apple parts and tools at support.apple.com/self-service-repair. During the purchase process, enter the manual ID **CWQBNX** to indicate that you've read this manual in its entirety and agree that you have the knowledge and experience to perform your intended repair.

### Software tools

Apple Diagnostics can check your Mac for hardware issues.

After performing a logic board or SSD modules repair in Mac Studio (2022), a separate Mac with Apple Configurator installed, a supported USB-C charge cable, and internet access are required to restore the operating system and update the firmware.

A System Configuration step may be required at the end of your repair. System Configuration is a postrepair software tool that completes the repair for genuine Apple parts. Running System Configuration has a number of purposes that vary based on the part replaced.

| What System Configuration does | Why it's important |
|---|---|
| **Updates replacement logic board with device serial number** | Replacement logic boards must be updated with your device's serial number to ensure that Apple Pay, FaceTime, iMessage, and iCloud services, such as Find My, can communicate safely and securely with your device. |
| **Transfers factory calibration values** | Certain parts like displays, cameras, and ambient light sensors have calibration values that are customized to each individual part during manufacturing. Transferring these values ensures maximum performance and quality after a repair. |
| **Links Secure Enclave and biometric authentication parts** | After repair of a logic board or a biometric authentication part (Touch ID), linking the biometric sensors to the Secure Enclave on the logic board is required to ensure device security. |
| **Ensures repair integrity** | After a hardware repair, software checks are performed to ensure repair integrity. Repair integrity means that a genuine Apple part has been correctly installed. |
| **Assigns wireless region** | To comply with regional communications regulations, a wireless region must be assigned to your logic board. |
| **Updates firmware** | Keeping firmware up to date ensures that the device has all the latest security and performance features. |

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System Configuration requires a strong Wi-Fi network capable of 1.0 Mbps download and upload speeds, with less than 400 ms latency and less than 2% packet loss. Estimated data usage to run System Configuration is 6–22 MB.

The repaired device must be running the latest version of macOS and not a beta version.

Learn how to initiate the System Configuration process at support.apple.com/self-service-repair.

## Alerts

Failure to follow alerts could result in electric shock, injury, data loss, or damage to the device, parts, or other property.

| | |
|---|---|
| **Danger** | Instructions for reducing risk of electric shock and electrocution |
| **Warning** | Instructions for reducing risk of personal injury |
| **Caution** | Instructions for reducing risk of data loss or device hardware damage |
| **Important** | Supplemental information for successfully completing procedures; neither a Warning nor a Caution |

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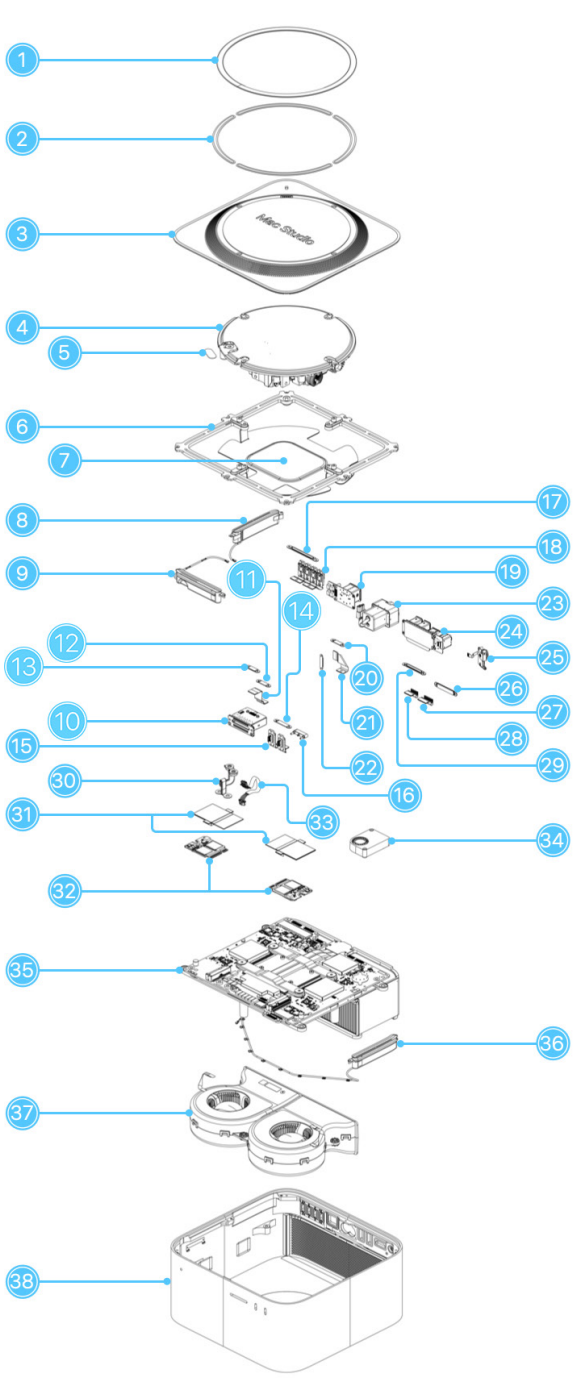
# Exploded View and Orderable Parts

This section shows parts, part names, and part numbers for Mac Studio (2022).

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| Part Name | Number |
|---|---|
| **1. Bottom cover screw pad** | 923-07115 |
| **2. Bottom cover screw pad adhesive strips** | 923-07944 |
| **3. Bottom cover** | 923-07116 |
| **4. Power supply** | 661-18533 |
| **5. Bus bar insulator cover** | 923-07329 |
| **6. Internal frame** | 923-07114 |
| **7. Internal frame plate** | 923-07117 |
| **8. Antenna 2** | 923-07088 |
| **9. Antenna 3** | 923-07089 |
| **10. SDXC card slot board** | 923-07120 |
| **11. SDXC card slot board flex cable** | 923-07119 |
| **12. SDXC card slot board connector cowling** | 923-07085 |
| **13. SDXC card slot board connector cowling** | 923-07085 |
| **14. Front USB-C ports connector cowling** | 923-07026 |
| **15. Front USB-C ports** | 923-07121 |
| **16. Front USB-C ports bracket** | 923-07027 |
| **17. Back Thunderbolt 4 ports connector cowling** | 923-07029 |
| **18. Back Thunderbolt 4 ports (2)** | 923-07122 |
| **19. Ethernet board** | 923-07123 |
| **20. Ethernet board connector cowling 1** | 923-07085 |
| **21. Ethernet board flex cable** | 923-07118 |
| **22. Ethernet board connector cowling 2** | 923-07086 |
| **23. Power cord port** | 923-07024 |
| **24. Combination input/output board** | 923-07124 |
| **25. Power button** | 923-07540 |
| **26. Combination input/output board connector cowling** | 923-07028 |
| **27. HDMI flex cable** | 923-07138 |

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| Part Name | Number |
|---|---|
| **28. USB-A flex cable** | 923-07137 |
| **29. Combination input/output board connector cowling** | 923-07028 |
| **30. Bus bar** | 923-07092 |
| **31. SSD module cover** | included with a replacement SSD module |
| **32. SSD modules (flash storage)** | 661-18528, 512 GB<br>661-18529, 1 TB<br>661-18530, 2 TB<br>661-18531, 4 TB<br>661-18532, 8 TB |
| **33. Power supply signal cable** | 923-07113 |
| **34. Speaker** | 923-07025 |
| **35. Logic board** | Apple M1 Max chip<br>661-18520, 10-core CPU, 24-core GPU, 32 GB<br>661-18521, 10-core CPU, 24-core GPU, 64 GB<br>661-18522, 10-core CPU, 32-core GPU, 32 GB<br>661-18523, 10-core CPU, 32-core GPU, 64 GB<br>Apple M1 Ultra chip<br>661-18524, 20-core CPU, 48-core GPU, 64 GB<br>661-18525, 20-core CPU, 48-core GPU, 128 GB<br>661-18526, 20-core CPU, 64-core GPU, 64 GB<br>661-18527, 20-core CPU, 64-core GPU, 128 GB |
| **36. Antenna 1** | 923-07087 |
| **37. Fan** | 923-07091 |
| **38. Housing** | 923-07090 |

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| Part Name (Not Shown) | Number |
| --- | --- |
| **Power cord**<br>Read the Important alert below to ensure that you order the correct power cord. | 923-07008 |

**Important**

The English (US) power cord part number begins with 923. Other regional power cord part numbers also begin with 923, but include a regional prefix. For example, the power cord part number for Italy begins with CI923. Identify the correct regional prefix from the list below:

B United Kingdom
C Italy
D Belgium/Luxembourg, France, Germany, Poland, Spain, Sweden

**Note:** The two SDXC card slot board connector cowlings and the Ethernet board connector cowling 1 share the same part number. The two combination input/output board connector cowlings share the same part number.

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# Screws

**Caution**

- Save undamaged screws and cowlings for reassembly.
- Note the location of screws and cowlings during removal. Then organize them to ensure that you reinstall them in the correct location.
- Both overtightened screws and loose screws can damage parts.

**923-0333**
Torx® T10

Fan (3)

**923-02313**
Torx T8

SSD module (1 or 2)

**923-03034**
Torx T6

Antenna 1 coaxial cable grounding clip (1)

**923-07093**
Torx T5

Back Thunderbolt 4 ports (6)

Front USB-C ports (2)

**923-07094**
Torx Plus 10IP

Logic board (4)

**923-07095**
Torx T6

Internal frame (7)

**923-07096**
Torx Plus 10IP

Power supply (4)

**923-07097**
Torx Plus 10IP

Power supply to bus bar (2)

**923-07098**
Torx Plus 10IP

Bus bar to logic board (2)

**923-07099**
Torx T4

Ethernet board connector cowling 2 (2)

**923-07100**
Torx T6

Combination I/O board to power cord port (2)

Ethernet board to power cord port (2)

**923-07101**
Torx T5

Antenna 1 (2)

Antenna 2 (2)

Antenna 3 (2)

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**923-07102**
Torx T5

Antenna 1 coaxial cable routing clips (8)

**923-07103**
Torx T7

Back Thunderbolt 4 ports standoff (2)

**923-07104**
Torx T5

Speaker (2)

**923-07105**
Torx T3

Back Thunderbolt 4 ports connector cowling (2)

Combination I/O board connector cowling (4)

Ethernet board connector cowling 1 (2)

Front USB-C ports connector cowling (2)

SDXC card slot board connector cowling (4)

**923-07106**
Torx T8

Bottom cover (4)

**923-07107**
Torx T6

Internal frame plate (3)

**923-07108**
Torx T8

Speaker standoff (2)

**923-07109**
Torx T5

SDXC card slot board (2)

**923-07111**
Torx T4

Combination I/O board (2)

**923-07112**
Torx T6

Internal frame (over power cord port) (1)

**923-07541**
Torx T3

Power button (3)

**923-07617**
Torx T5 screw kit[1]

Battery (2)

[1] The Torx T5 screw kit includes two Torx T5 screws and a battery cover.

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# Tools

Tools with part numbers are available for purchase from the Self Service Repair Store. Tools without part numbers can be purchased from electronics supply retailers.

**923-0735**
Adjustable torque driver (0.3–1.2 Nm)

**923-06026**
Adjustable torque driver (1.2–3 Nm)

**923-02995**
Adjustable torque driver (10–34 Ncm)

**923-01322**
Antenna tool

ESD mat

ESD-safe tweezers

ESD wrist strap with clip or plug

Ethanol wipes[1]

Ethernet cable

HDMI cable

IPA wipes

**922-1731**
Kapton tape

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Magnetizer

922-5065
Nylon probe (black stick)

923-00105
Torque driver (green, 0.45 kgf cm)

923-07183
Torx Plus 10IP 50 mm bit

923-07060
Torx T3 half-moon bit

Torx T3 screwdriver

Torx T4 screwdriver

923-02996
Torx T5 bit

Torx T5 screwdriver

Torx T6 screwdriver

923-00304
Torx T6 security bit[2]

Torx T7 screwdriver

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**923-0734**
Torx T8 bit

Torx T8 screwdriver

**923-0740**
Torx T10 bit

Torx T10 screwdriver

**661-06670**
USB-C charge cable

[1] Ethanol wipes must contain at least 90% ethanol and no additives except isopropyl alcohol.
[2] You can use a Torx T6 bit or Torx T6 security bit.

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# Electrical Safety

**Danger**

The power supply remains powered when the device is plugged in whether or not the device has been turned on. Don’t touch the logic board or power supply while the device is plugged into an electrical outlet.

**Be aware of the following precautions to avoid electric shock:**

- Never remove or install any parts while the device is plugged into an electrical outlet.
- Always wait at least 2 minutes after unplugging the device to allow the logic board or power supply or both to discharge.
- Don’t touch the logic board or power supply before the 2-minute discharge wait time has passed.

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# First Steps

**Always perform the following steps before starting a repair:**

- Back up the Mac.
- If replacing the logic board, turn off Find My Mac. Choose Apple Menu > System Preferences > Apple ID. Select iCloud in the sidebar. Then deselect the Find My Mac checkbox. If you're unable to access the Apple menu, continue performing the following steps.
- Turn off the Mac.
- If you were unable to turn off Find My Mac from the Apple menu, go to iCloud.com/find on a different device. Select All Devices. Select the device you want to remove. Then select Remove from Account.
- Unplug the power cord from both the electrical outlet and the back of the device. Keep the power cord unplugged while the device is being repaired.
- Disconnect all other cables from the device.
- Clear and clean your workspace.
- Put on an ESD wrist strap and attach it to a properly grounded ESD mat.

**Caution**

ESD (electrostatic discharge, or the release of static electricity) can damage electronic components.

**Be aware of the following while performing a repair:**

- The manual for this model may show images of other models, but the procedures are the same. Ensure that you use the correct tools for the model you're repairing.
- Take your time. Thoroughly read all instructions and alerts.
- Magnetizing the screwdrivers will make it easier to work with small screws.
- Use only Kapton tape to secure cables and keep them out of the way when removing and reinstalling parts.
- The end of each flex cable must align with its connector. Press the end of each flex cable to its connector until it clicks to ensure that it's secure.

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# Bottom Cover

## Before You Begin

### Tools

- Adjustable torque driver (0.3–1.2 Nm)
- ESD-safe tweezers
- Ethanol wipes or isopropyl alcohol (IPA wipes)
- Nylon probe (black stick)
- Torx T8 bit
- Torx T8 screwdriver

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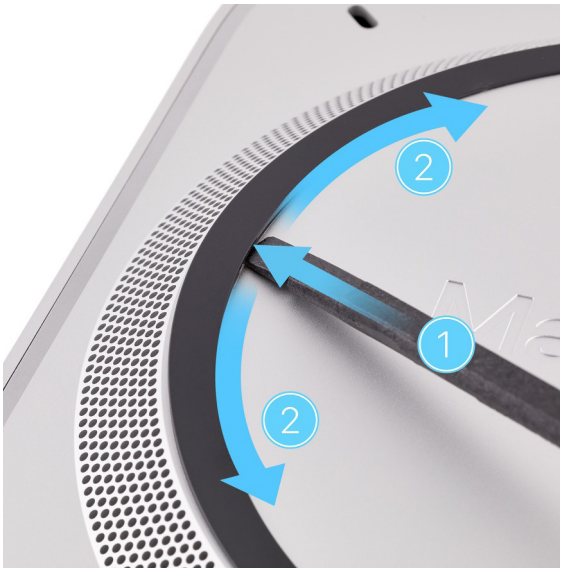
## Removal

1. Place the computer with the bottom cover facing up and the front ports facing you.

2. Insert the flat end of the black stick under the inner edge of the bottom cover screw pad (1). Slide the black stick under the screw pad (2) to separate it from the bottom cover.

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3. Remove the bottom cover screw pad from the bottom cover.

4. Use the flat end of the black stick to gently scrape the adhesive off the underside of the bottom cover screw pad.

5. Use ethanol wipes or IPA wipes to clean any adhesive residue from the underside of the bottom cover screw pad. Save the bottom cover screw pad for reassembly.

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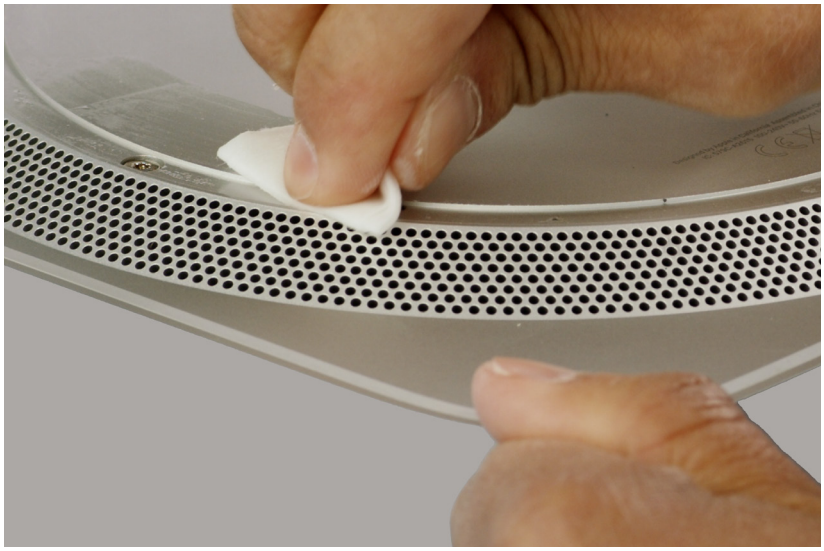
6. Use ESD-safe tweezers to pick up the adhesive on the bottom cover. Then pull the adhesive to remove it. Repeat this process until all the adhesive is removed from the bottom cover.

7. Use ethanol wipes or IPA wipes to clean any adhesive residue from the bottom cover.



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8. Use the T8 screwdriver to remove the four T8 screws (923-07106) from the bottom cover.

9. Insert the black stick into one of the ventilation holes on the bottom cover and easily lift the bottom cover off the housing.

**Important**

Ensure that you've removed all four T8 screws before you lift the bottom cover.

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## Reassembly

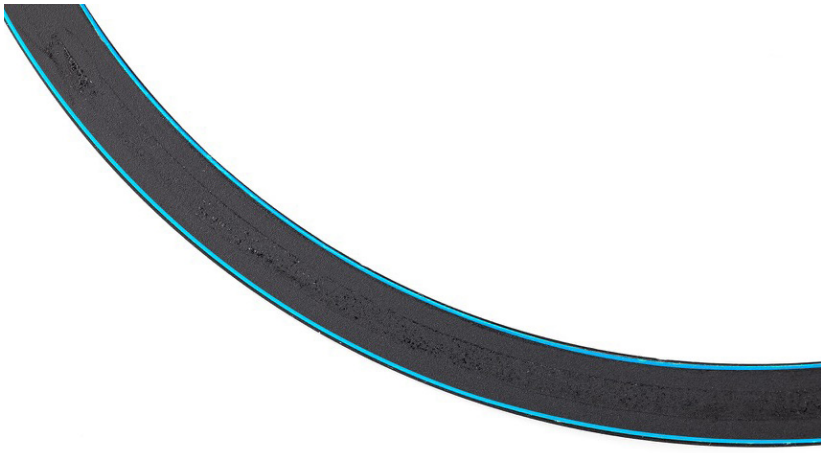
1. Position the bottom cover on the housing.

2. Insert the Torx T8 bit into the 0.3–1.2 Nm adjustable torque driver. Set the torque value to 1.1 Nm.

3. Use the adjustable torque driver and Torx T8 bit to reinstall the four T8 screws (923-07106) into the bottom cover.

4. Identify the underside of the bottom cover screw pad.

   **Note**: The underside of the bottom cover screw pad adheres to the bottom cover and has a slightly raised center. The outer side of the bottom cover screw pad is flat.



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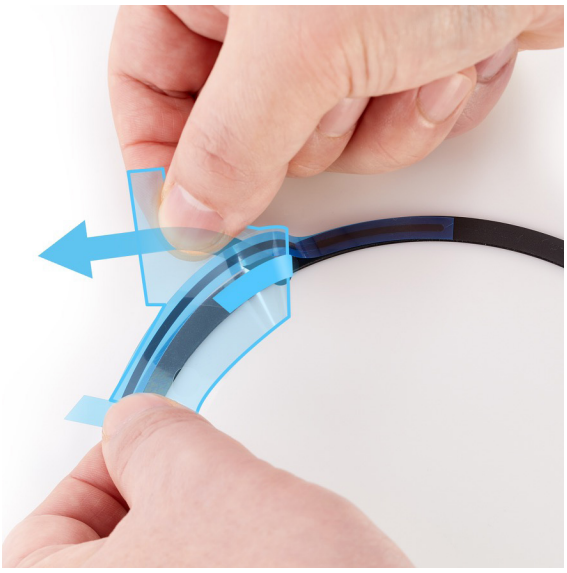
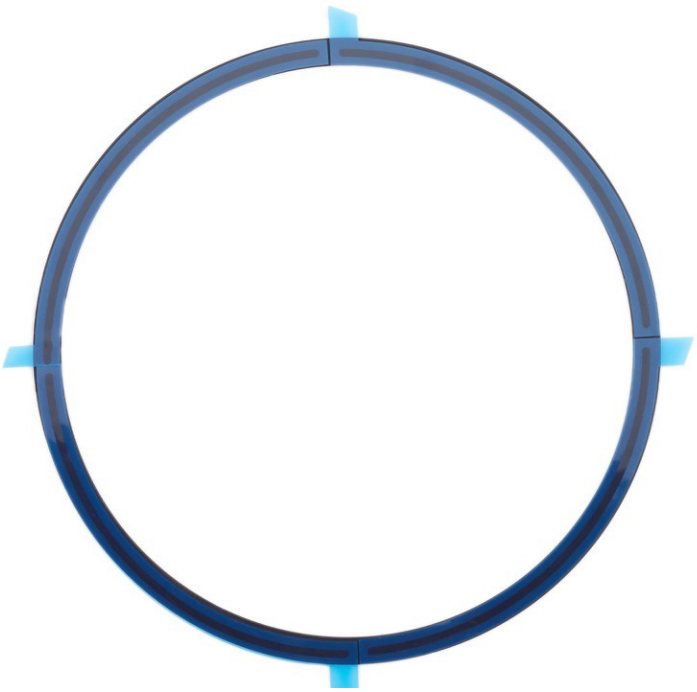
5. Align four adhesive strips along the underside of the bottom cover screw pad. Peel the adhesive backing off each adhesive strip as you press the strip onto the bottom cover screw pad.



6. Gently run the flat end of the black stick along the length of the adhesive strips to adhere them to the bottom cover screw pad.



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7. Position the bottom cover screw pad in the channel of the bottom cover with the flat side of the bottom cover screw pad facing up. Align the four release liner tabs with the four screws on the bottom cover.

8. Peel the four release liners off the adhesive strips as you press the bottom cover screw pad to adhere it to the bottom cover.

**Caution**

- After you've completed all removal and reassembly steps, learn how to initiate the System Configuration process at support.apple.com/self-service-repair.
- System Configuration is required if you've installed a replacement logic board or SSD modules.
- If you replaced the logic board, the computer will start up in Diagnostics mode until you complete System Configuration.
- If you replaced the SSD modules, the computer will not start up and the status indicator light will flash amber. Follow the instructions to first restore the operating system and update the firmware. Then you can perform System Configuration.

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# Power Supply

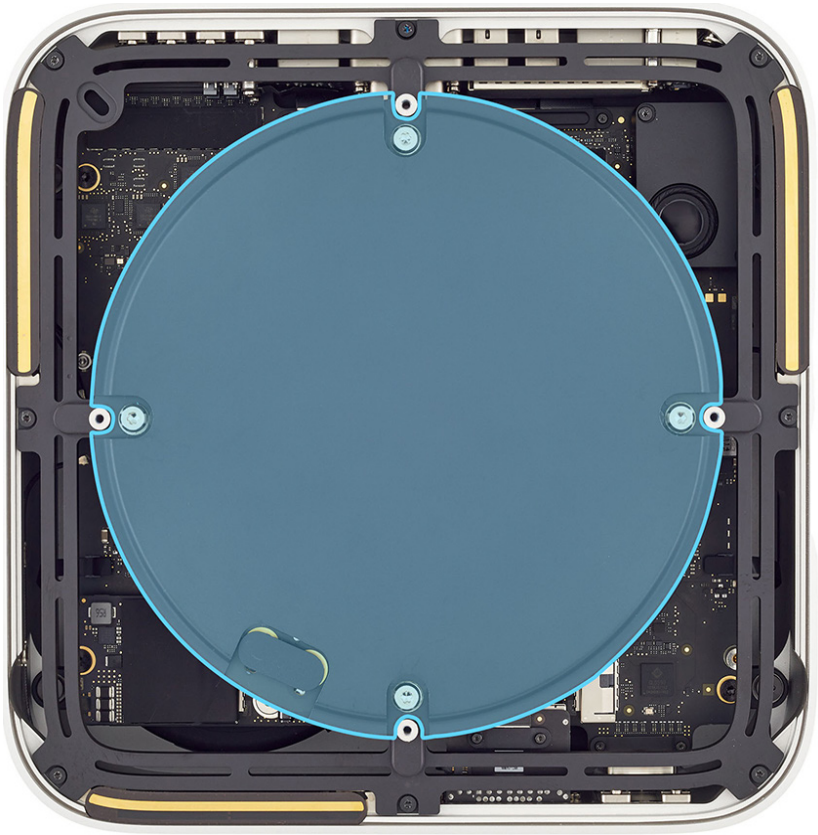
## Before You Begin

**Remove the following part before you begin:**

- Bottom cover

**Tools**

- Adjustable torque driver (0.3–1.2 Nm)
- ESD-safe tweezers
- Nylon probe (black stick)
- Torx Plus 10IP 50 mm bit



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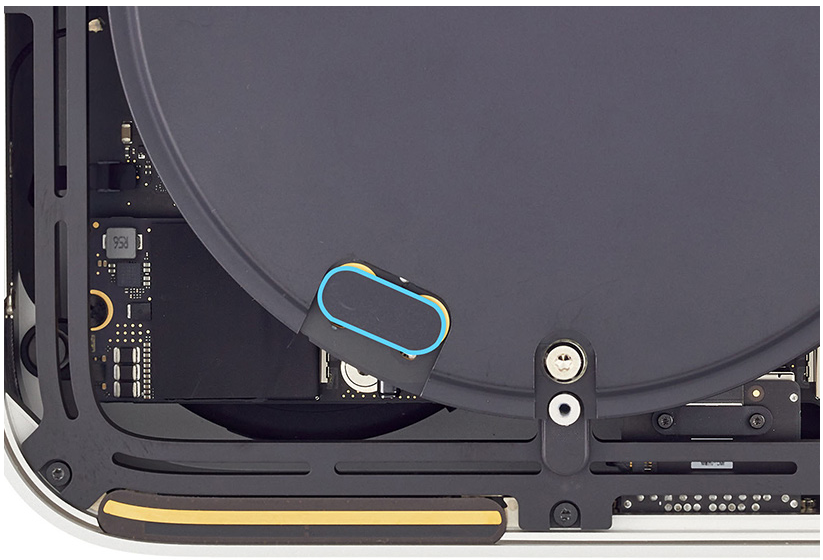
## Removal

1. Use ESD-safe tweezers to peel off the bus bar insulator cover. Discard the bus bar insulator cover.



2. Insert the 10IP bit into the 0.3–1.2 Nm adjustable torque driver.

3. Use the adjustable torque driver and 10IP bit to remove the two 10IP screws (923-07097) from the power supply and bus bar.

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4. Use the adjustable torque driver and 10IP bit to remove the four 10IP screws (923-07096) from the power supply.

5. Slightly tilt up the power supply. Pinch the end of the power supply signal cable. Pull the end of the power supply signal cable to slide it out of the connector. Then tilt down the power supply onto the internal frame.

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6. Rotate the computer so the back ports are facing you.

7. Slightly tilt up the power supply. Pinch and hold the clip on the end of the power cord port cable (1). Then pull the end of the power cord port cable to slide it out of the connector (2).

8. Lift the power supply off the internal frame and out of the housing.

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## Reassembly

1. Position the power supply over the housing. Ensure that the power cord port connector and the power supply signal connector on the power supply are aligned with the power cord port cable and the power supply signal cable in the housing.

2. Then lower the power supply onto the internal frame. Align the four notches on the power supply with the four screw mounts on the internal frame.

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3. Rotate the computer so the back ports are facing you. Slightly tilt up the power supply. Slide the end of the power cord port cable into the connector. Ensure that the clip is engaged. Then tilt down the power supply onto the internal frame.

**Caution**

Don't strain the power cord port cable when tilting up the power supply.

4 Rotate the computer so the front ports are facing you. Slightly tilt up the power supply. Slide the end of the power supply signal cable into the connector. Then tilt down the power supply onto the internal frame.

**Caution**

Don't strain the power supply signal cable when tilting up the power supply.

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5. Ensure that the two pins on the bus bar are aligned with the two alignment holes in the power supply.

6. Keep the 10IP bit in the 0.3–1.2 Nm adjustable torque driver. Ensure that the torque value is still set to 0.7 Nm.

7. Use the adjustable torque driver and 10IP bit to reinstall the four 10IP screws (923-07096) into the power supply.

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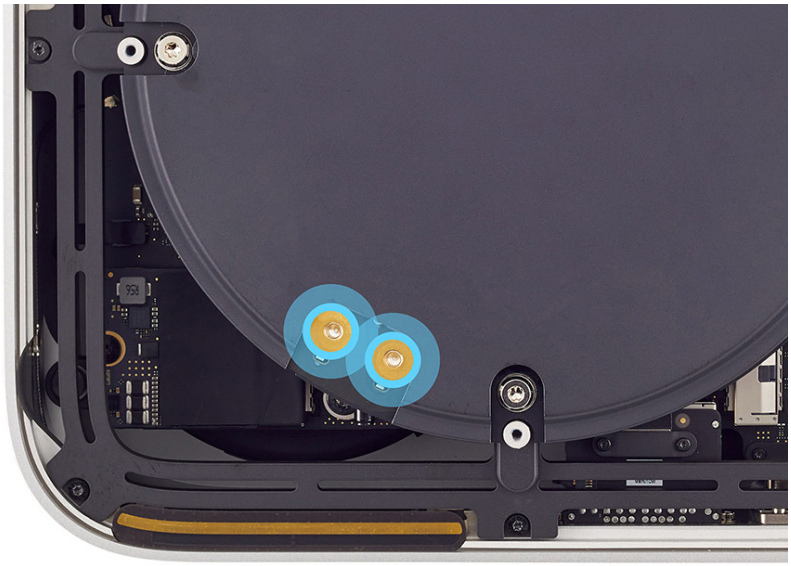
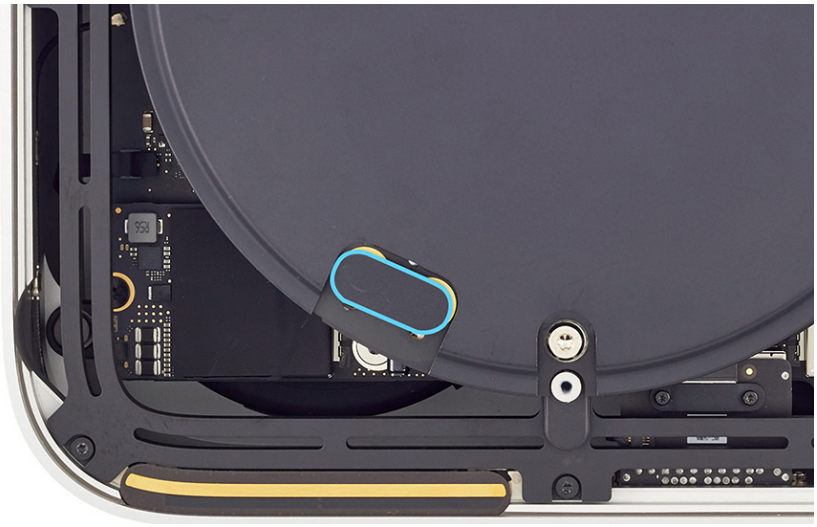
8. Keep the 10IP bit in the 0.3–1.2 Nm adjustable torque driver. Set the torque value to 0.6 Nm.

9. Use the adjustable torque driver and 10IP bit to reinstall the two 10IP screws (923-07097) into the power supply and bus bar.



10. Adhere a replacement bus bar insulator cover over the two screws.



**Reinstall the following part to complete reassembly:**

- Bottom cover

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# Internal Frame

## Before You Begin

**Remove the following parts before you begin:**

- Bottom cover
- Power supply

**Tools**

- Adjustable torque driver (0.3–1.2 Nm)
- Adjustable torque driver (10–34 Ncm)
- Torx T6 bit
- Torx T6 screwdriver

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## Removal

1. Use a torque driver to remove the T6 screw (923-07112) (1) over the power cord port.

2. Use a torque driver to remove the remaining seven T6 screws (923-07095) from the internal frame.

   **Note:** The T6 screw over the power cord port is shorter than the other seven T6 screws.

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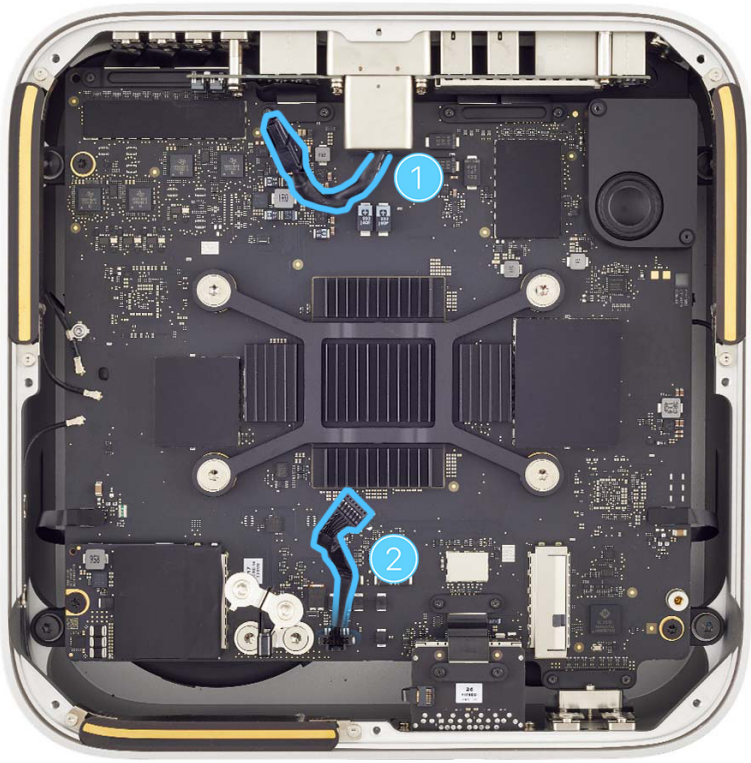
3. Move the power cord port cable (1) and power supply signal cable (2) out of the way as you lift the internal frame out of the housing.

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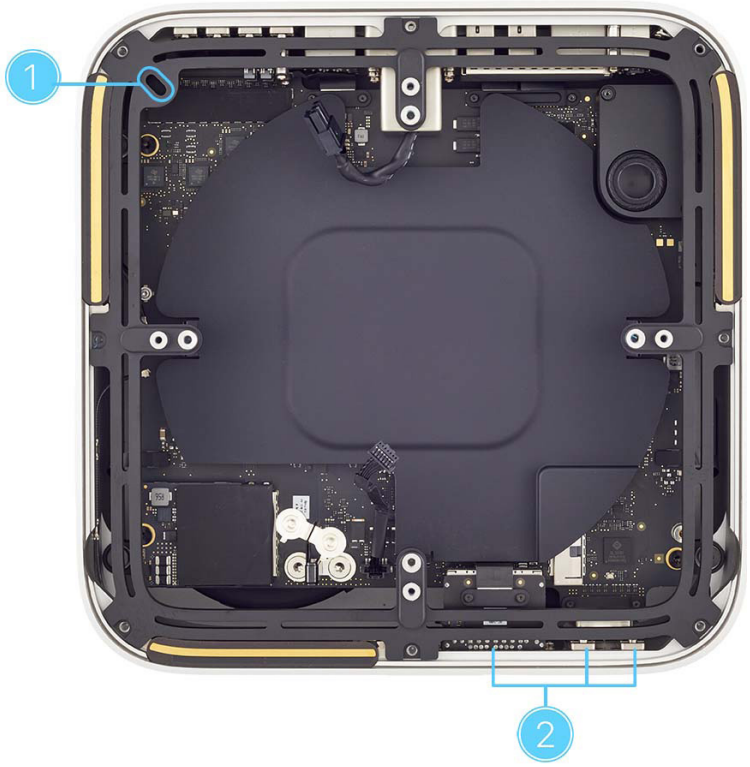
## Reassembly

1. Position the internal frame over the housing with the lock slot (1) opposite the SDXC card slot board and the front USB-C ports (2).

2. Lower the internal frame into the housing.

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3. Use the T6 screwdriver to partially reinstall one T6 screw (923-07112) (1) over the power cord port.

4. Use the T6 screwdriver to partially reinstall the remaining seven T6 screws (923-07095) into the internal frame.

   **Note:** The T6 screw over the power cord port is shorter than the other seven T6 screws.

5. Insert the Torx T6 bit into the 10–34 Ncm adjustable torque driver. Set the torque value to 29.5 Ncm.

6. Use the adjustable torque driver and Torx T6 bit to fully reinstall the T6 screw over the power cord port.

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7. Remove the Torx T6 bit from the 10–34 Ncm adjustable torque driver. Insert the Torx T6 bit into the 0.3–1.2 Nm adjustable torque driver. Set the torque value to 0.6 Nm.

8 Use the adjustable torque driver and Torx T6 bit to fully reinstall the remaining seven T6 screws.

**Reinstall the following parts to complete reassembly:**

- Power supply
- Bottom cover

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# Antenna 2

## Before You Begin

**Remove the following parts before you begin:**

- Bottom cover
- Power supply
- Internal frame

**Tools**

- Adjustable torque driver (10–34 Ncm)
- Antenna tool
- Torx T5 bit
- Torx T5 screwdriver

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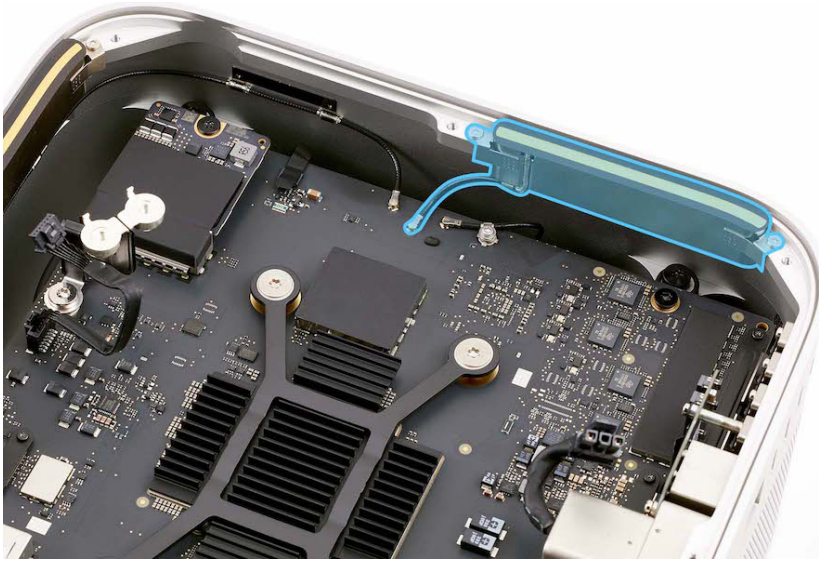
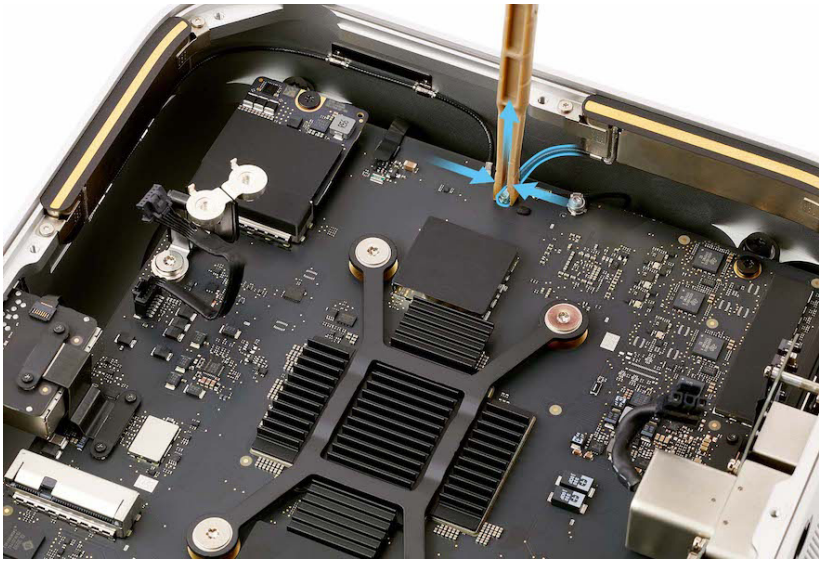
## Removal

1. Position the computer as shown.



2. Use the antenna tool to lift the end of the antenna coaxial cable off the connector.



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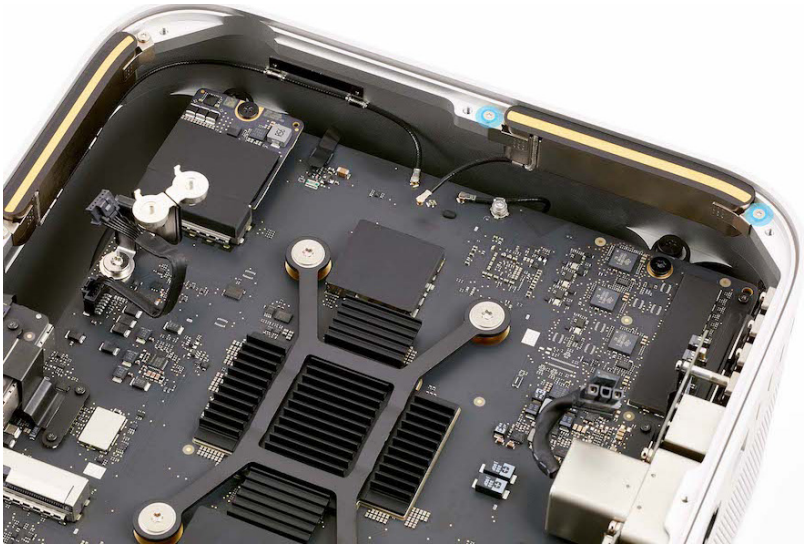
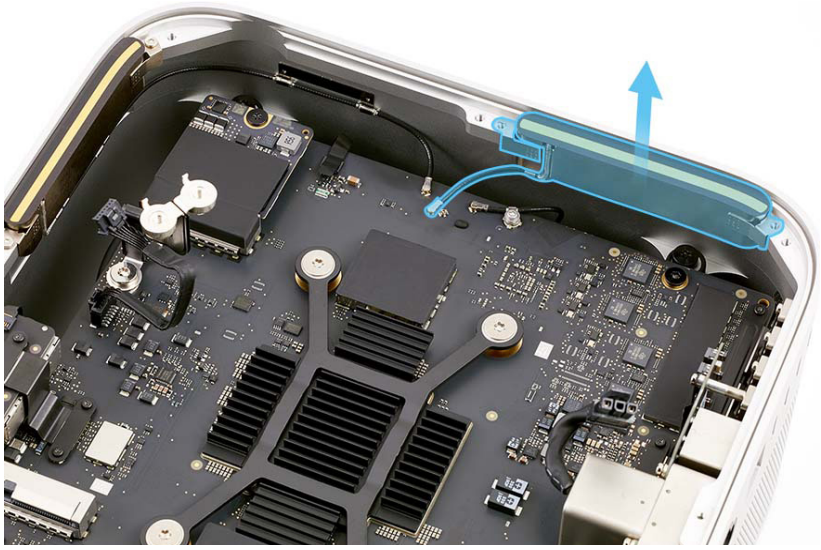
3. Use the T5 screwdriver to remove the two T5 screws (923-07101) from antenna 2.



4. Lift antenna 2 out of the housing.



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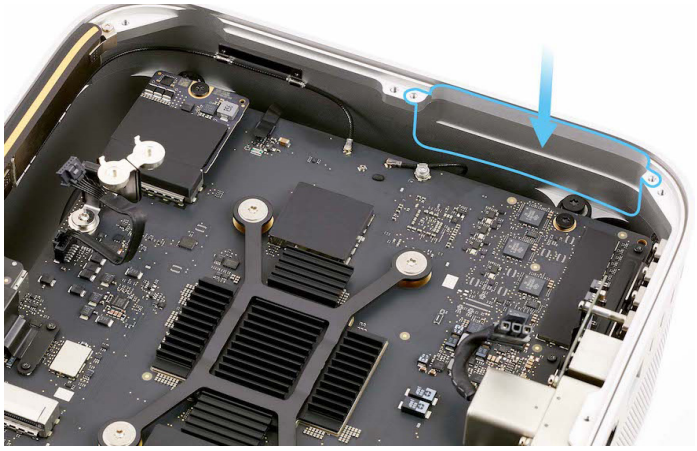
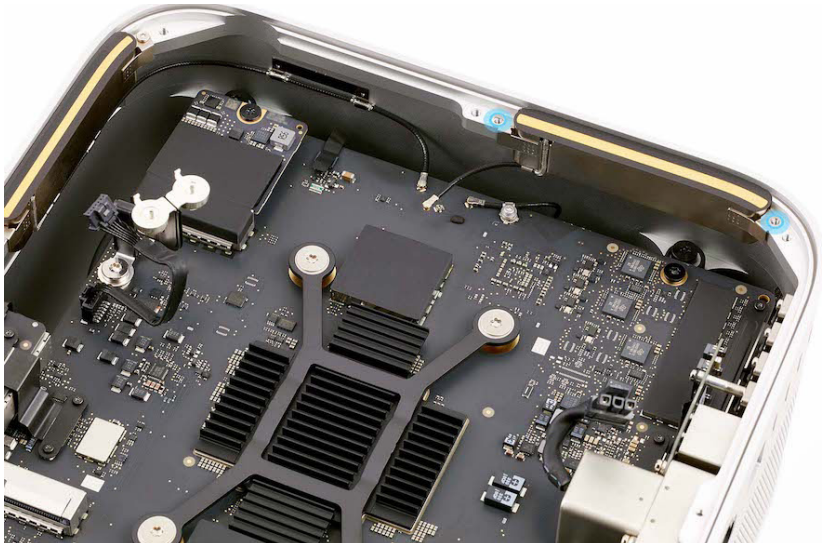
## Reassembly

1. Position antenna 2 in the housing.



2. Insert the Torx T5 bit into the 10–34 Ncm adjustable torque driver. Set the torque value to 11.5 Ncm.

3. Use the adjustable torque driver and Torx T5 bit to reinstall the two T5 screws (923-07101) into antenna 2.



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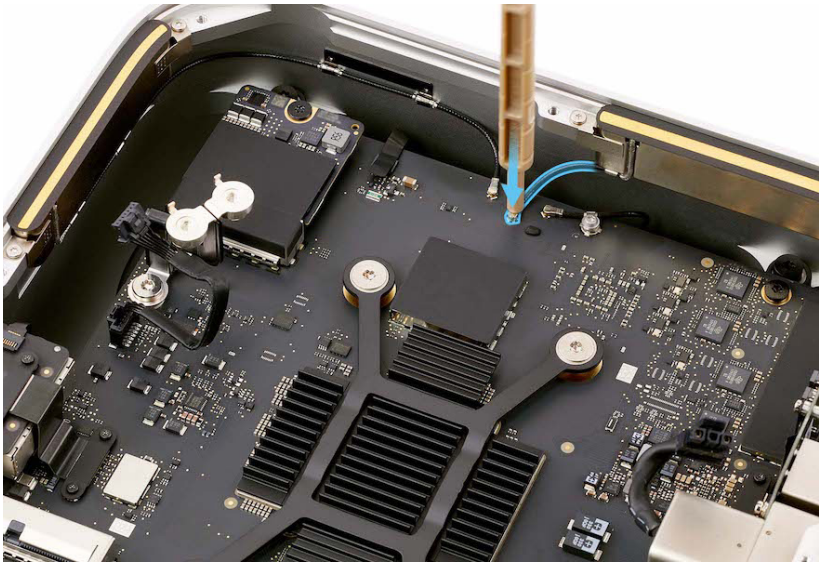
4. Use the blunt end of the antenna tool to press the end of the antenna coaxial cable to the connector.



**Reinstall the following parts to complete reassembly:**

- Internal frame
- Power supply
- Bottom cover

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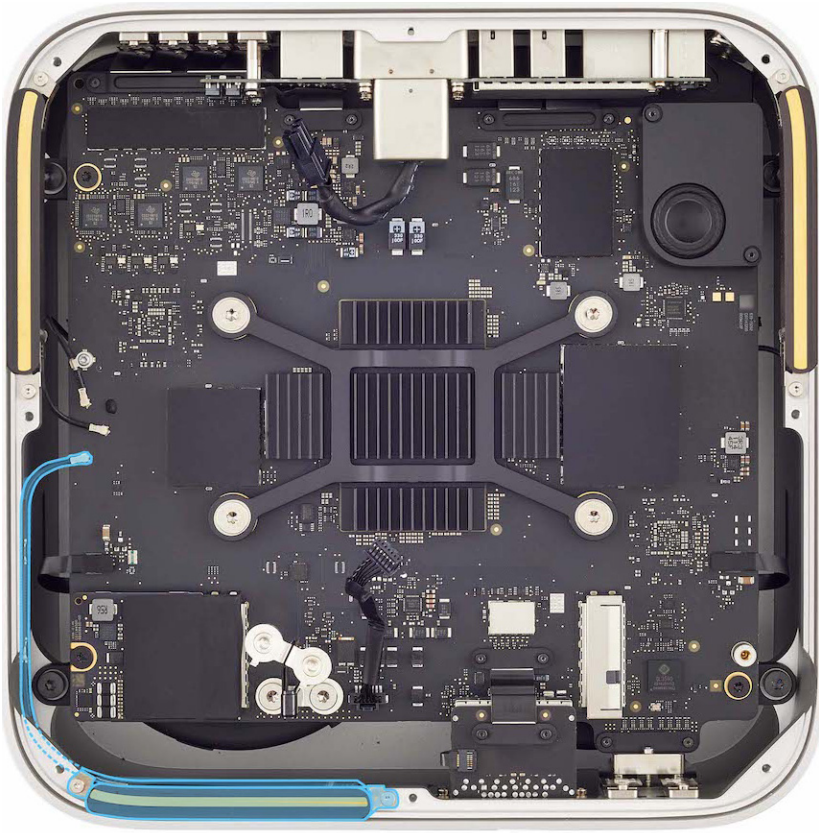
# Antenna 3

## Before You Begin

**Remove the following parts before you begin:**

- Bottom cover
- Power supply
- Internal frame



### Tools

- Adjustable torque driver (10–34 Ncm)
- Antenna tool
- Nylon probe (black stick)
- Torx T5 bit
- Torx T5 screwdriver

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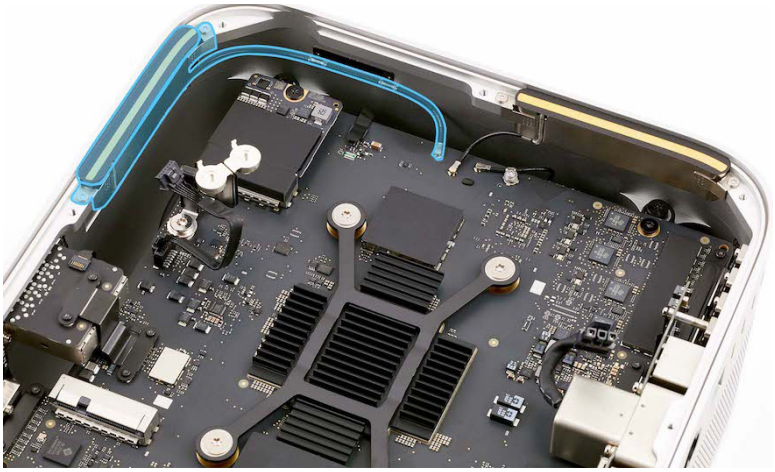
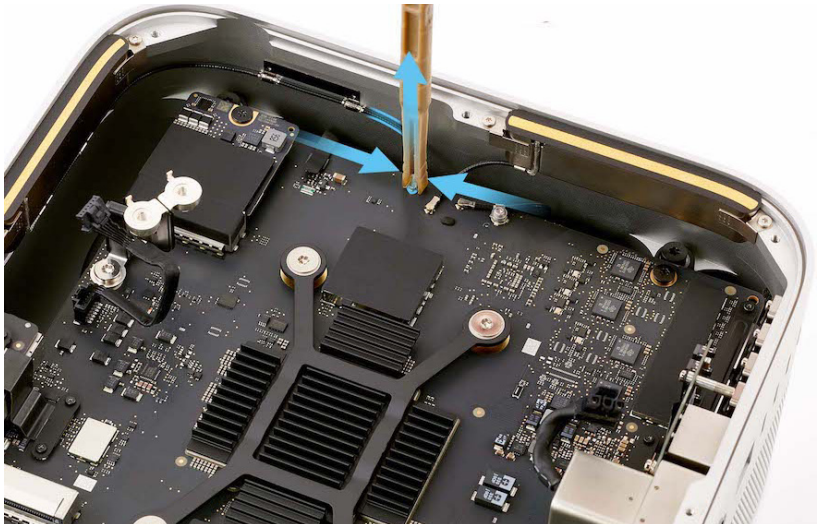
## Removal

1. Position the computer as shown.



2. Use the antenna tool to lift the end of the antenna coaxial cable off the connector.



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3. Lift the antenna coaxial cable out of the antenna coaxial cable grounding clips in the housing.

4. Use the T5 screwdriver to remove the two T5 screws (923-07101) from antenna 3.

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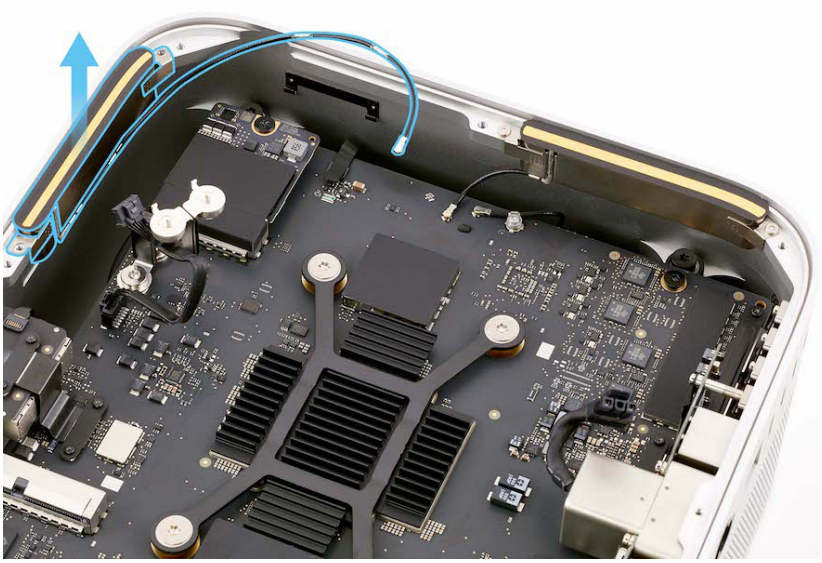
5. Lift antenna 3 out of the housing.



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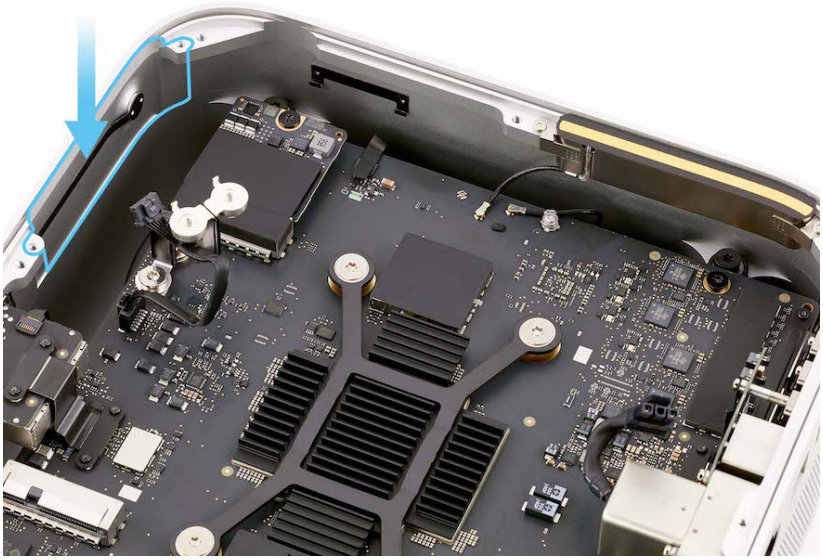
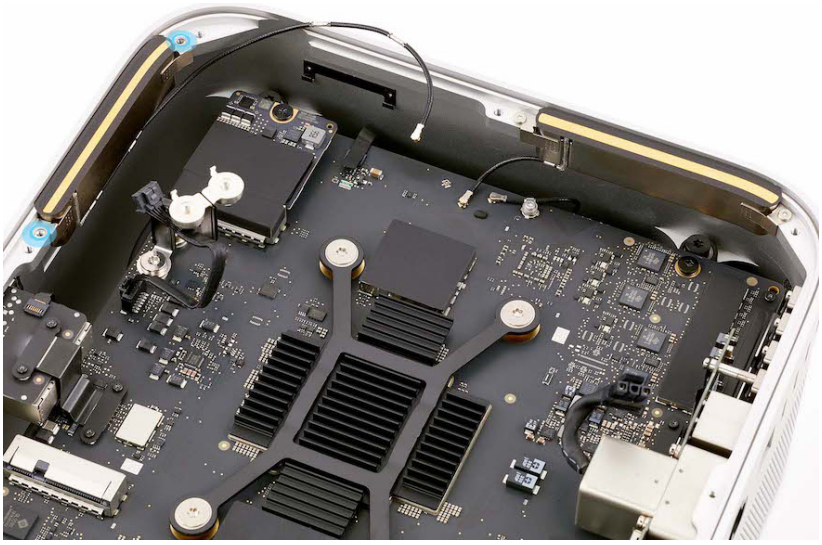
## Reassembly

1. Position antenna 3 in the housing.



2. Insert the Torx T5 bit into the 10–34 Ncm adjustable torque driver. Set the torque value to 11.5 Ncm.

3. Use the adjustable torque driver and Torx T5 bit to reinstall the two T5 screws (923-07101) into antenna 3.



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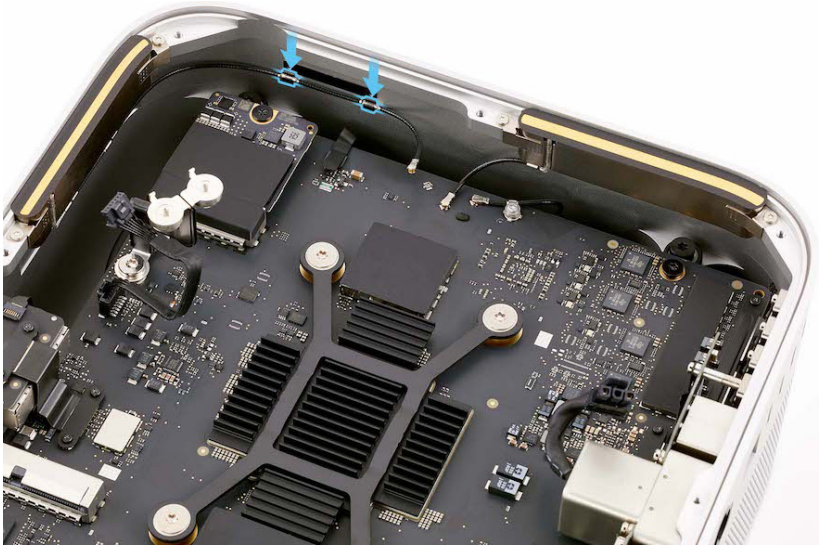
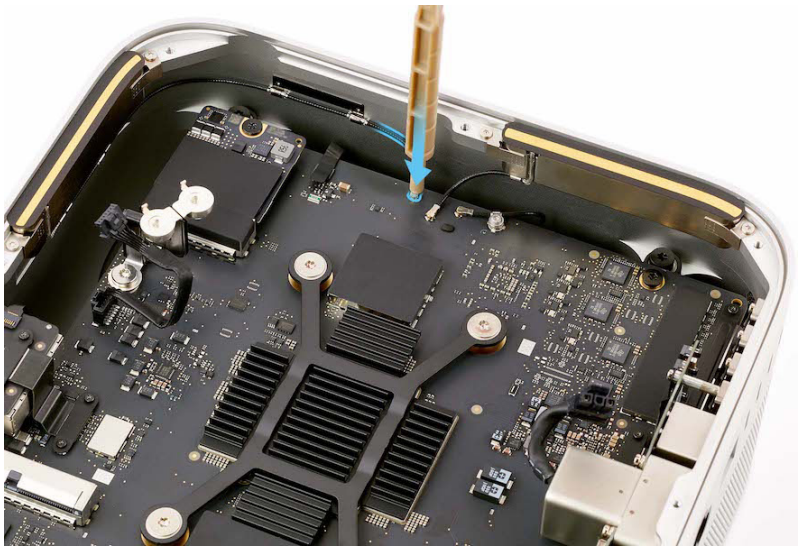
4. Use the black stick to press the antenna coaxial cable into the antenna coaxial cable grounding clips in the housing.



5. Use the blunt end of the antenna tool to press the end of the antenna coaxial cable to the connector.



**Reinstall the following parts to complete reassembly:**

- Internal frame
- Power supply
- Bottom cover

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# Ethernet Board

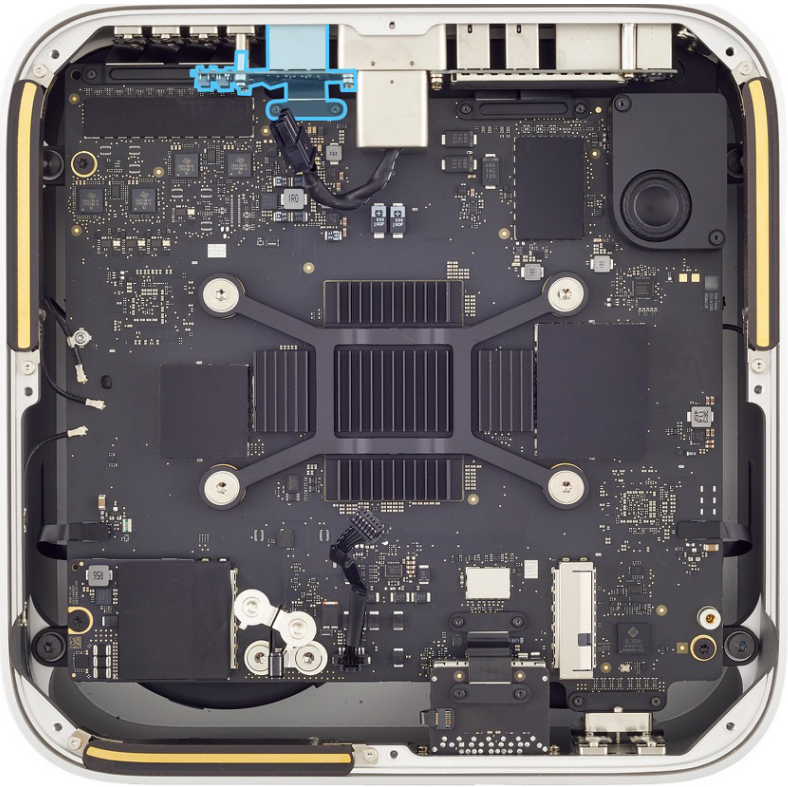
## Before You Begin

**Remove the following parts before you begin:**

- Bottom cover
- Power supply
- Internal frame

**Tools**

- Ethernet cable
- Nylon probe (black stick)
- Torque driver (green, 0.45 kgf cm)
- Torx T3 half-moon bit
- Torx T4 screwdriver
- Torx T6 screwdriver



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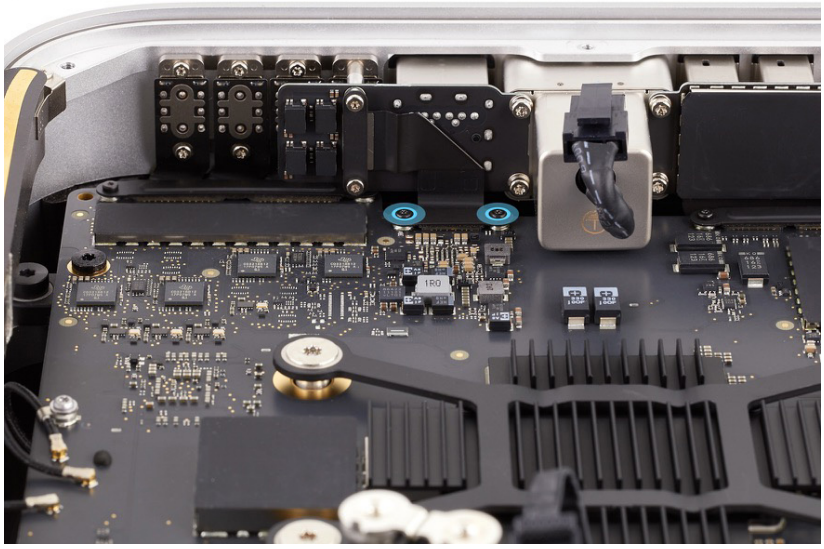
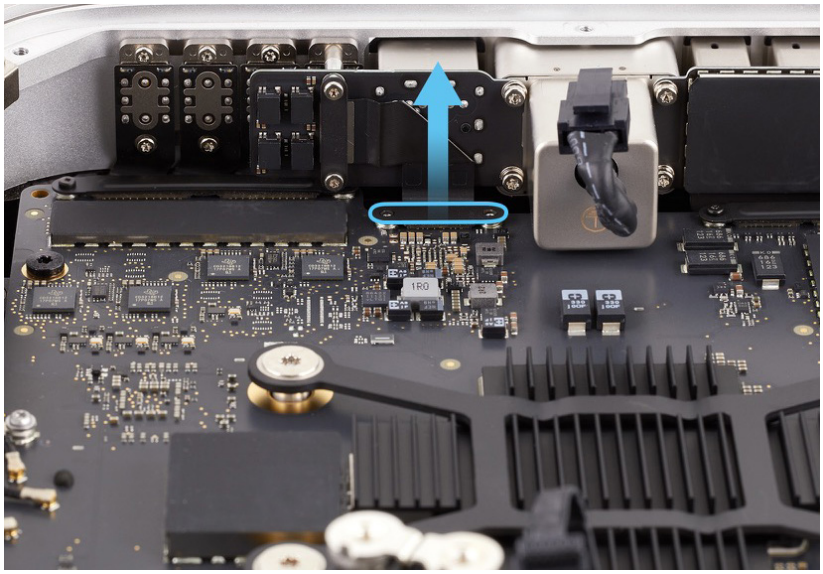
## Removal

1. Use the green torque driver and Torx T3 half-moon bit to remove the two T3 screws (923-07105) from Ethernet board connector cowling 1.



2. Remove Ethernet board connector cowling 1 and save it for reassembly.



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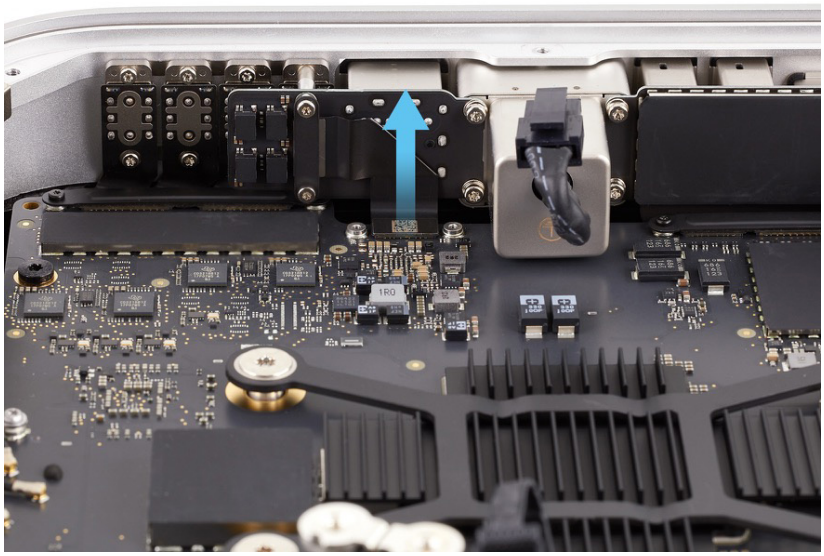
3. Use the black stick to lift the end of the Ethernet board flex cable off the connector on the logic board.



4. Stand the computer on its back with the front ports facing up.

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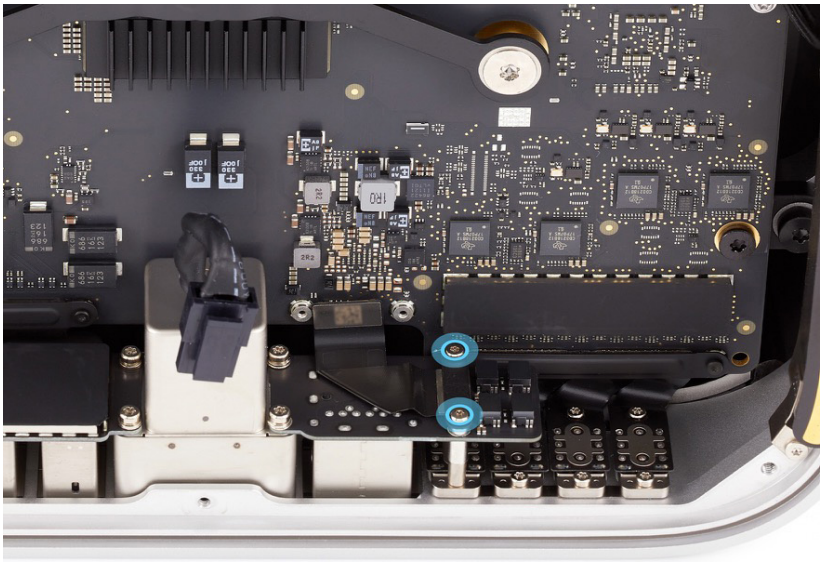
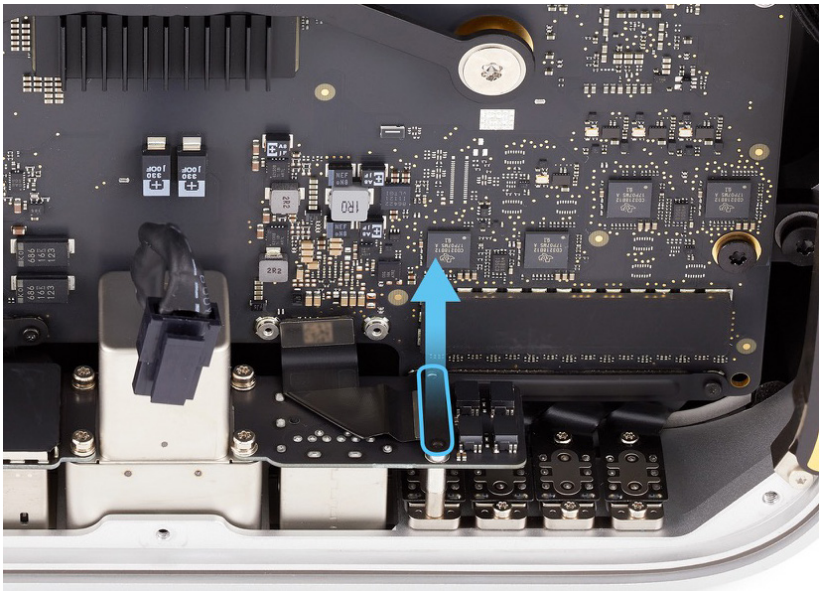
5. Use the T4 screwdriver to remove the two T4 screws (923-07099) from Ethernet board connector cowling 2.



6. Remove Ethernet board connector cowling 2 and save it for reassembly.



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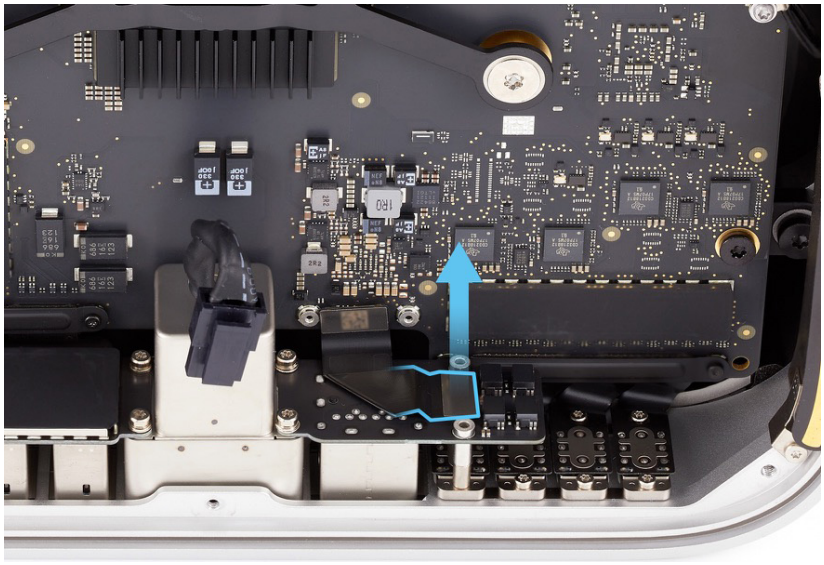
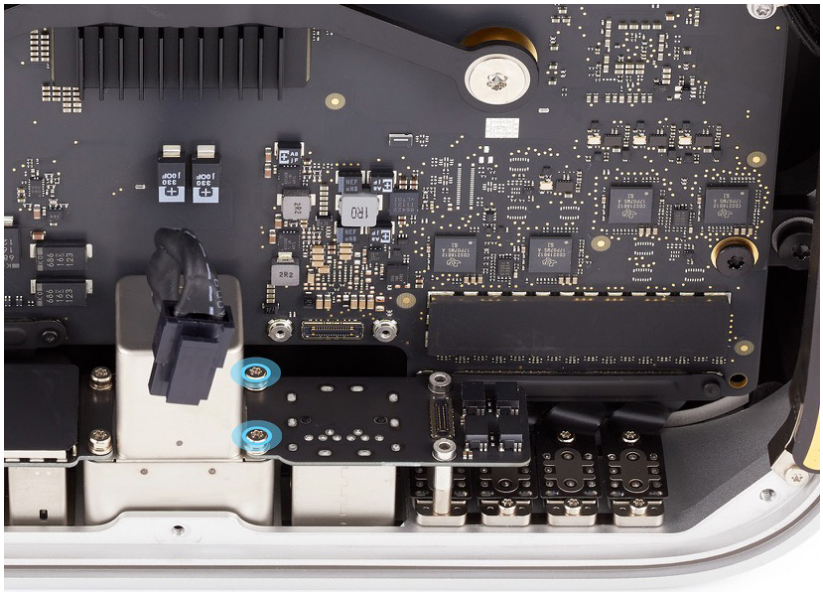
7. Use the black stick to lift the end of the Ethernet board flex cable off the connector on the Ethernet board.



8. Use the T6 screwdriver to remove the two T6 screws (923-07100) from the Ethernet board and power cord port.



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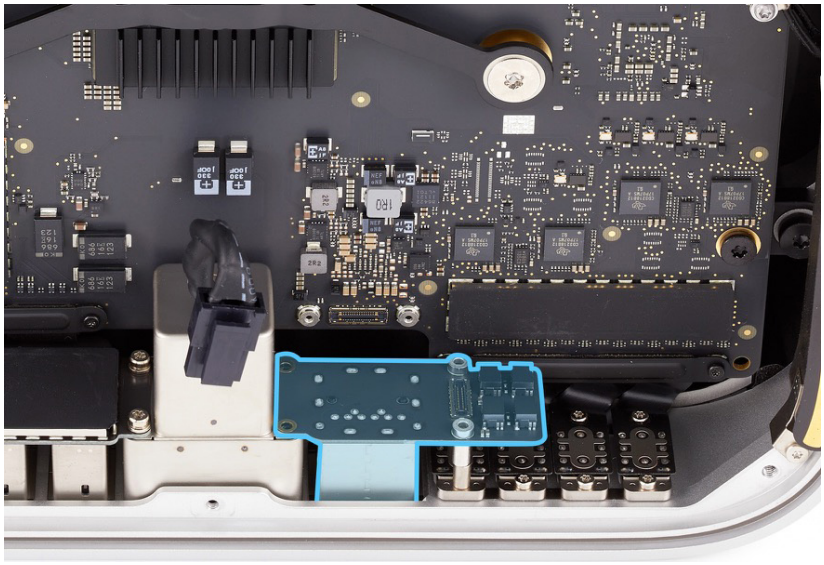
9. Lift the Ethernet board out of the housing.



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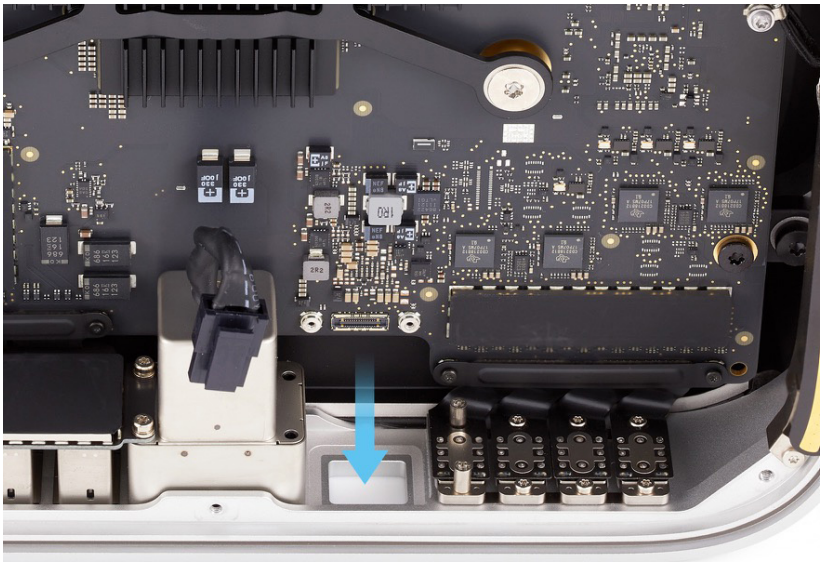
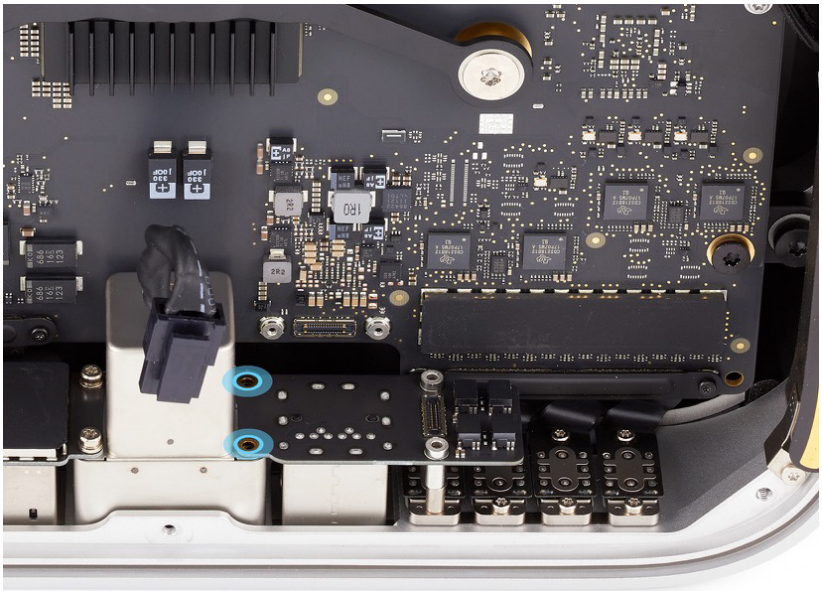
## Reassembly

1. Position the Ethernet board in the housing.



2. Use the T6 screwdriver to partially reinstall the two T6 screws (923-07100) into the Ethernet board.

   **Note:** The screws pass through screw holes in the Ethernet board and power cord port and thread into the housing.



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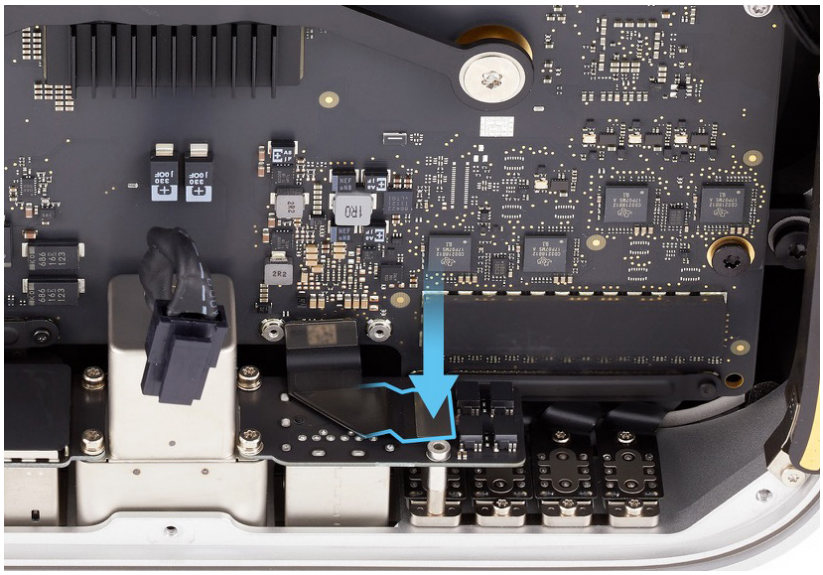
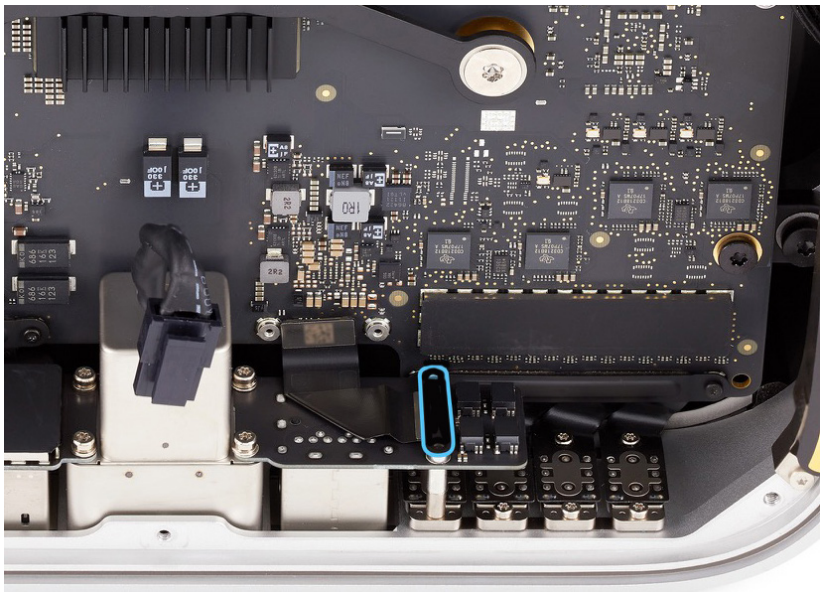
3. Press the end of the Ethernet board flex cable to the connector on the Ethernet board.



4. Position Ethernet board connector cowling 2 over the connector.



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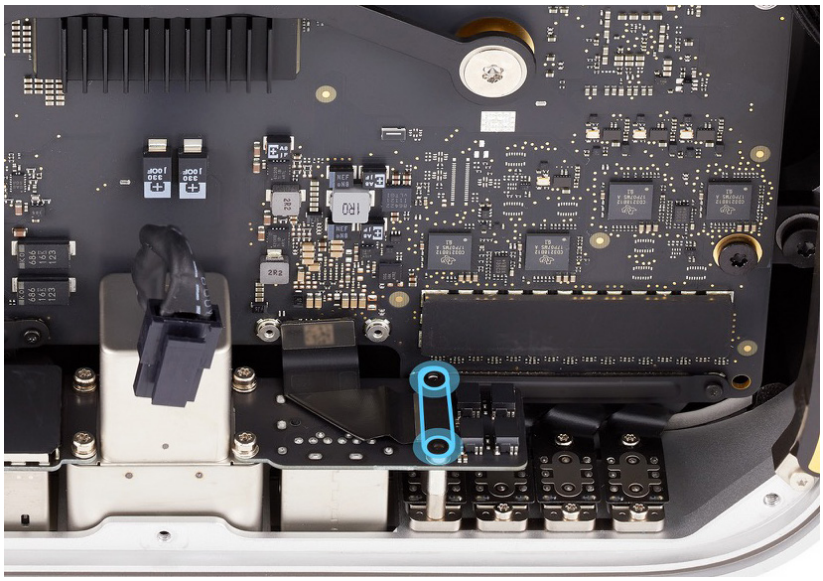
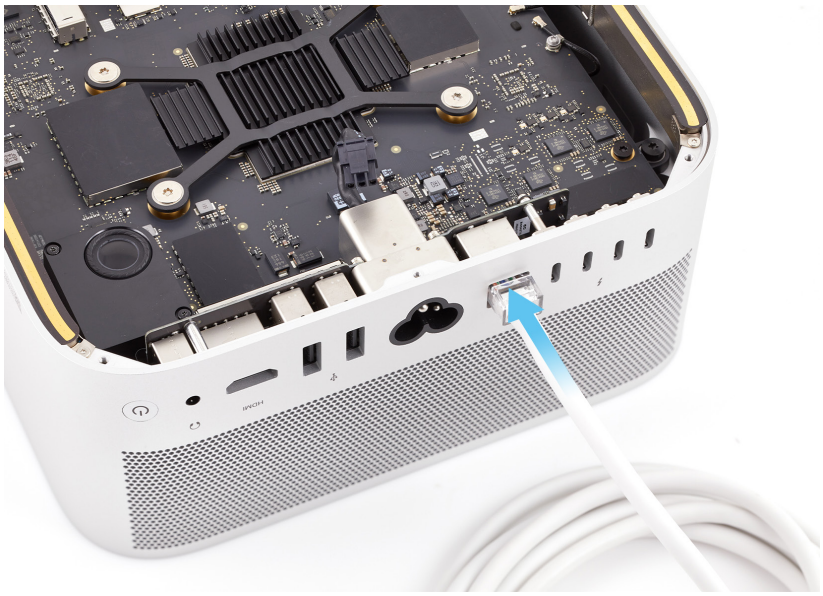
5. Use the T4 screwdriver to partially reinstall the two T4 screws (923-07099) into Ethernet board connector cowling 2.

   **Note:** The screws pass through the cowling and Ethernet board and thread into the standoff screws of the back Thunderbolt 4 ports.



6. Position the computer as shown.
7. Plug an Ethernet cable into the Ethernet port to ensure Ethernet board alignment. Adjust the alignment of the Ethernet board until the end of the cable is easy to insert and remove.



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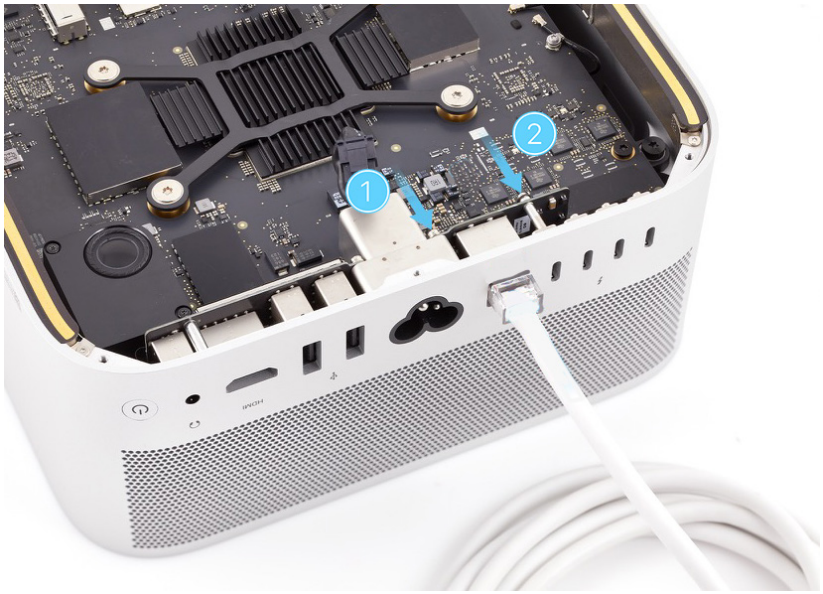
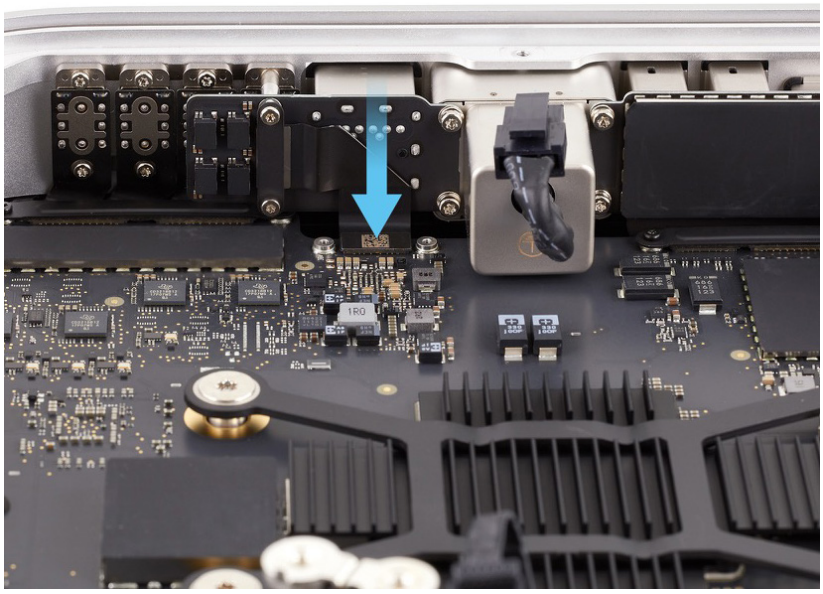
8. Use the T6 screwdriver to fully reinstall the two T6 screws into the Ethernet board (1).

9. Use the T4 screwdriver to fully reinstall the two T4 screws into Ethernet board connector cowling 2 (2).




10. Rotate the computer so the front ports are facing you.

11. Press the end of the Ethernet board flex cable to the connector on the logic board.



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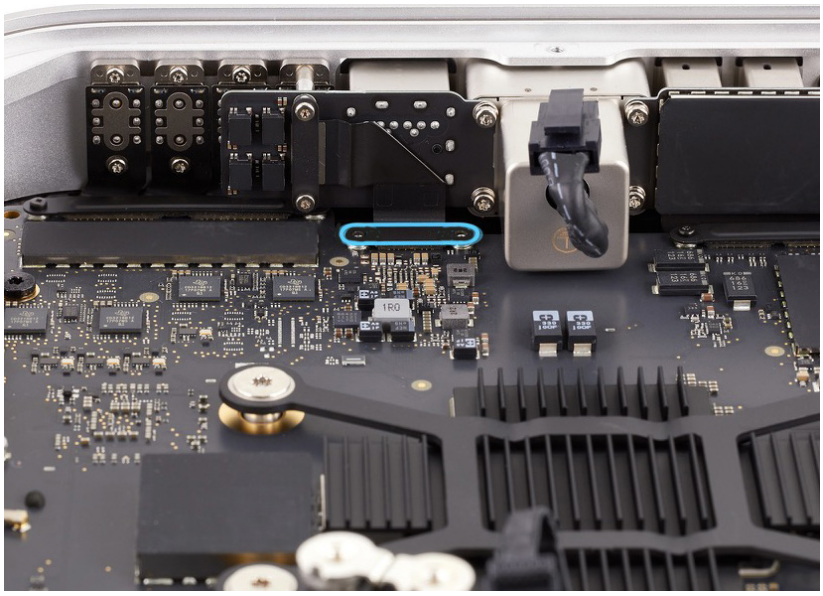
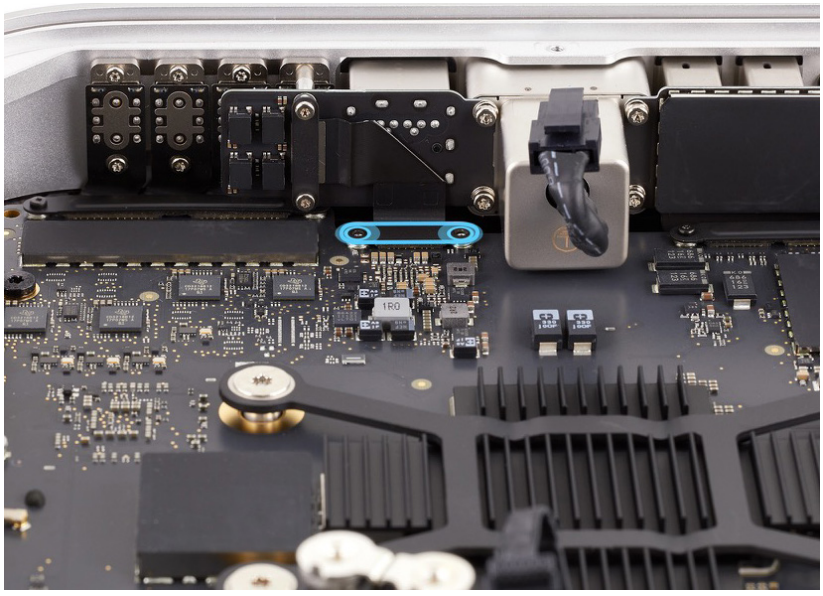
12. Position Ethernet board connector cowling 1 over the end of the Ethernet board flex cable.



13. Use the green torque driver and Torx T3 half-moon bit to reinstall the two T3 screws (923-07105) into the cowling.



**Reinstall the following parts to complete reassembly:**

- Internal frame
- Power supply
- Bottom cover

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# SSD Modules

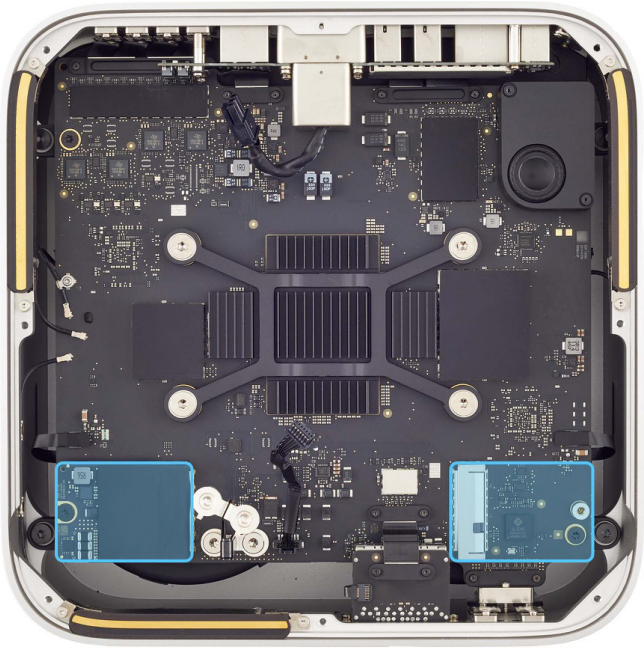
## Before You Begin

**Remove the following parts before you begin:**

- Bottom cover
- Power supply
- Internal frame

**Tools**

- ESD-safe tweezers
- Torx T8 screwdriver



**Caution**

- This procedure requires System Configuration. After you've completed all removal and reassembly steps, learn how to initiate the System Configuration process at support.apple.com/self-service-repair.
- If you replace the SSD modules, you'll need a separate Mac with Apple Configurator installed to restore the operating system and update the firmware.

**Important**

SSD modules must be replaced in pairs except in a device with a 512 GB configuration, which has a single SSD module. This procedure shows the removal and reassembly of a single SSD module. However, the steps are the same for removing and reinstalling two SSD modules.

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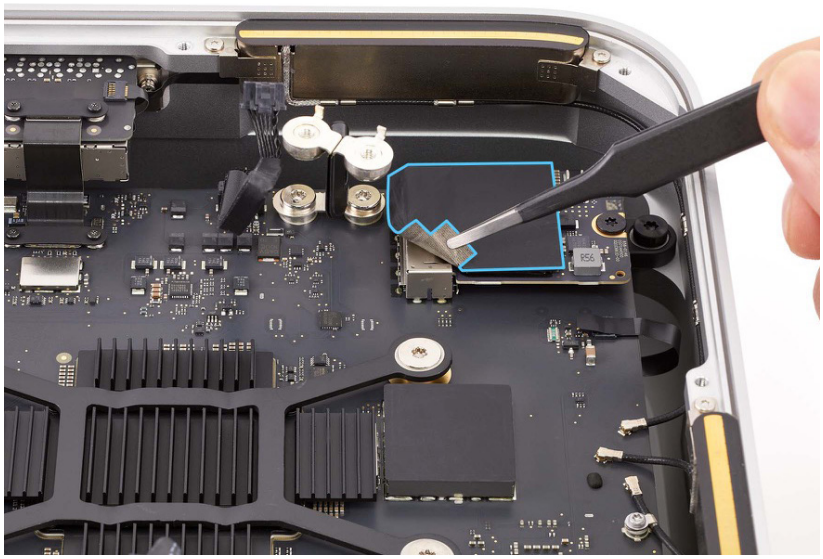
## Removal

1. Place the computer as shown.

2. Use ESD-safe tweezers to peel the SSD module cover off the SSD module.



### Important

A replacement SSD module cover is included with SSD module replacement parts. If you're replacing the SSD module, discard the SSD module cover. If you're removing the SSD module as part of another procedure, save the SSD module cover for reassembly.

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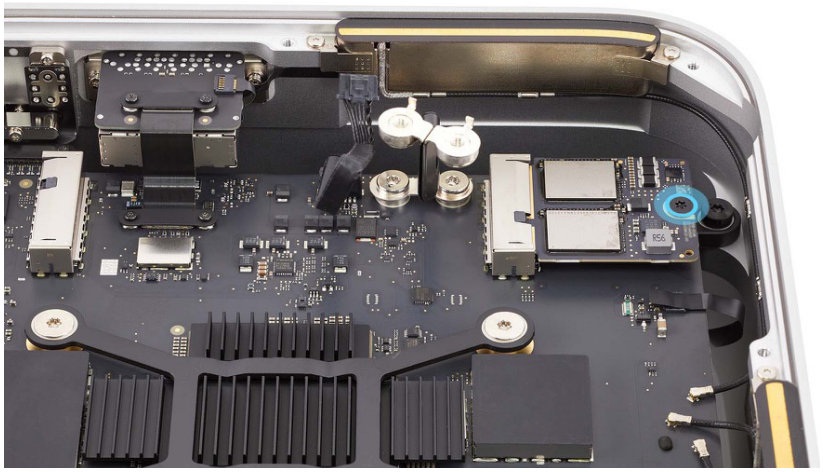
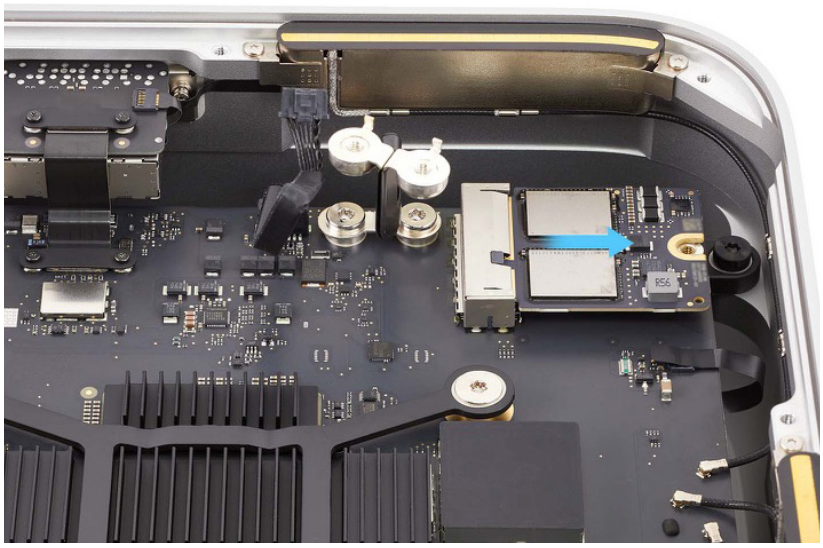
3. Use the T8 screwdriver to remove the T8 screw (923-02313) from the SSD module.



4. Grasp the sides of the SSD module and firmly pull it from the SSD module connector.

**Caution**

Don't tilt or lift the SSD module when removing it from the SSD module connector.



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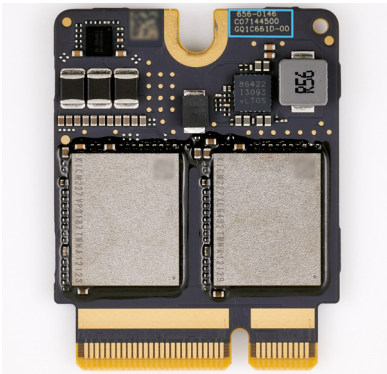
## Reassembly

### Important

If you're installing a replacement SSD module, complete all reassembly steps. If you're reinstalling your existing SSD module, skip to step 2.

1. Peel the temporary regulatory label off the back of the replacement SSD module before installing it.

2. Each SSD module has a serial number that ends in 00 or 01. Identify the corresponding SSD module connector for the SSD module.



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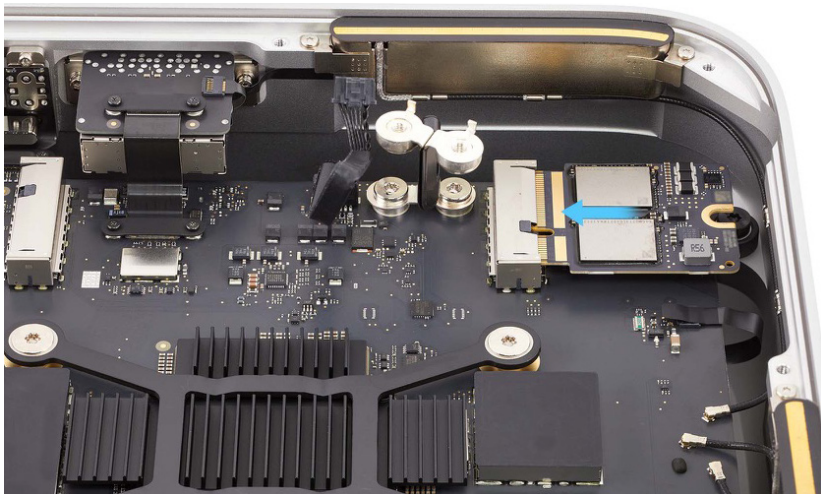
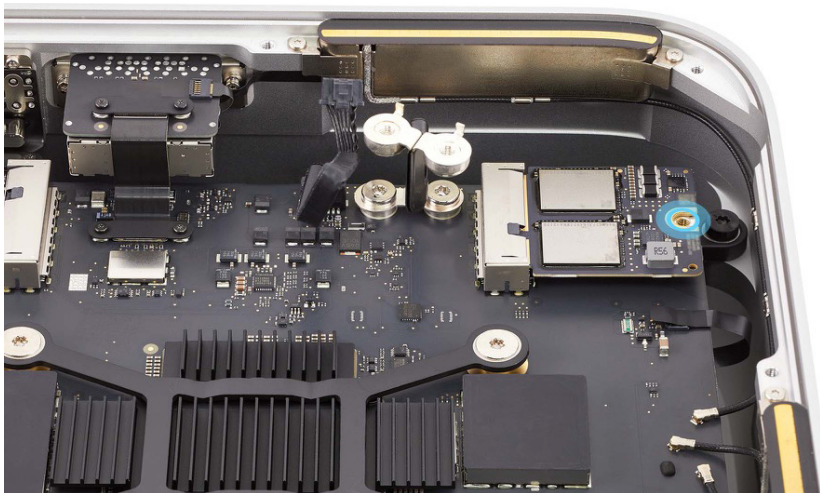
3. Grasp the sides of the SSD module and firmly slide it into the SSD module connector.



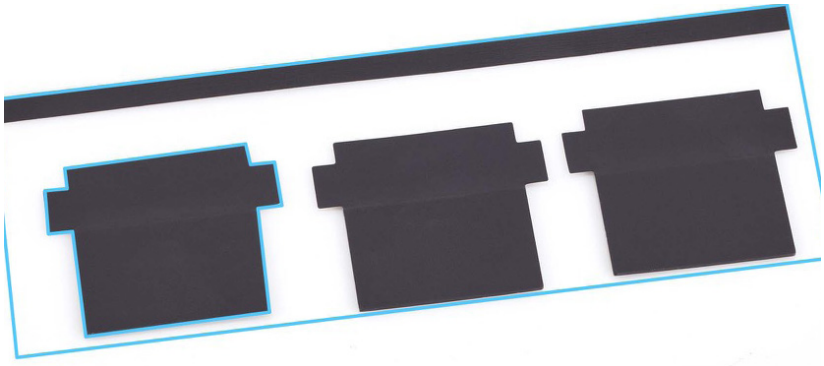
**Caution**

Don't tilt or lift the SSD module when inserting it into the SSD module connector.

4. Use the T8 screwdriver to reinstall the T8 screw (923-02313) into the SSD module.



5. If you're reinstalling the existing SSD module, skip to reassembly step 6. If you're installing a replacement SSD module, peel a replacement SSD module cover from the adhesive backing.



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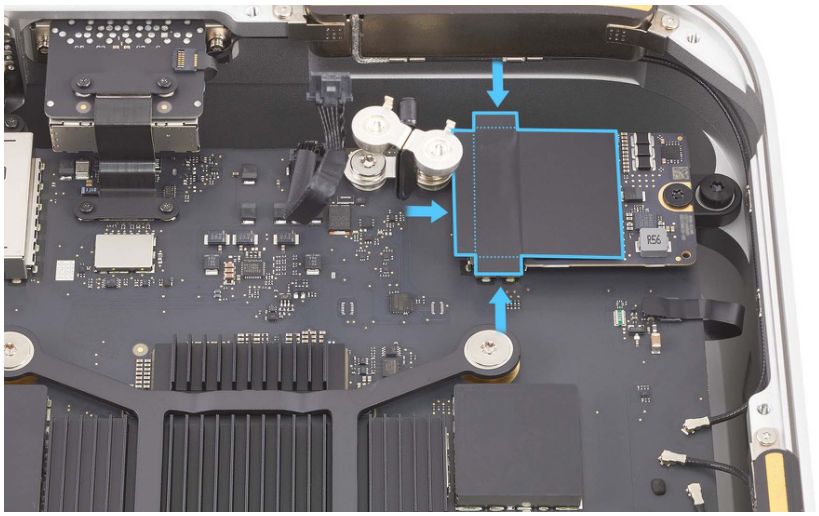
6. Position the SSD module cover over the SSD module and connector as shown. Then fold the three polyester film tabs over the edges of the SSD module connector. Press the tabs onto the sides of the connector.



**Reinstall the following parts to complete reassembly:**

- Internal frame
- Power supply
- Bottom cover

**Caution**

- After you've completed all removal and reassembly steps, learn how to initiate the System Configuration process at support.apple.com/self-service-repair.
- If you replaced the SSD modules, the computer will not start up and the status indicator light will flash amber. Follow the instructions to first restore the operating system and update the firmware. The time to restore your Mac will vary based on your network connection speed to the internet.
- After you restore the computer, it will automatically start up to macOS Recovery. Select a language, connect to the internet, then follow the onscreen instructions to activate your Mac.

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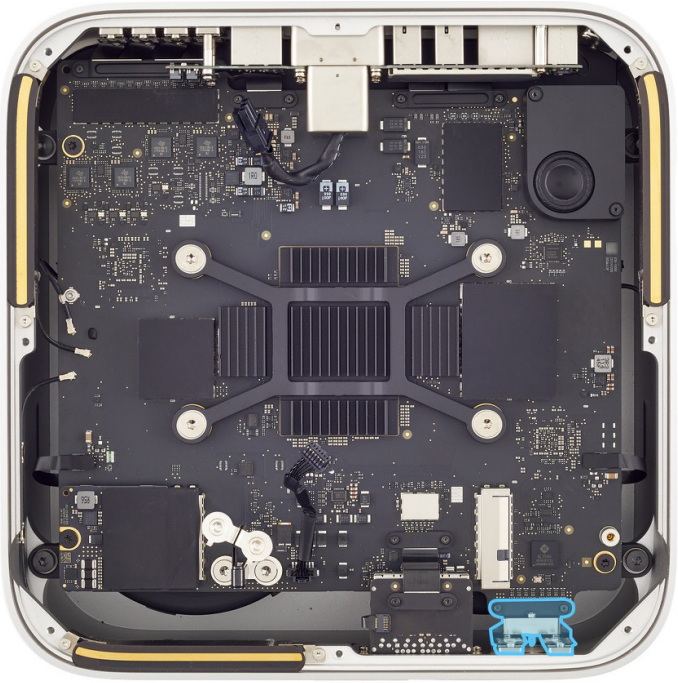
# Front USB-C Ports

## Before You Begin

**Remove the following parts before you begin:**

- Bottom cover
- Power supply
- Internal frame



### Tools

- Nylon probe (black stick)
- Torque driver (green, 0.45 kgf cm)
- Torx T3 half-moon bit
- Torx T3 screwdriver
- Torx T5 screwdriver
- USB-C charge cable

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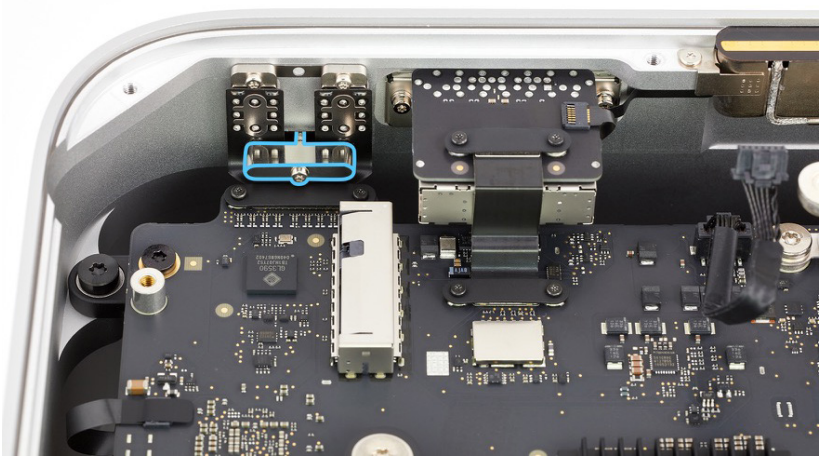
## Removal

1. Place the computer so the back ports are facing you.

2. Use the T5 screwdriver to fully loosen the T5 screw on the front USB-C bracket. Remove the bracket and save it for reassembly.

   **Note:** The T5 screw is captive and stays attached to the front USB-C bracket.



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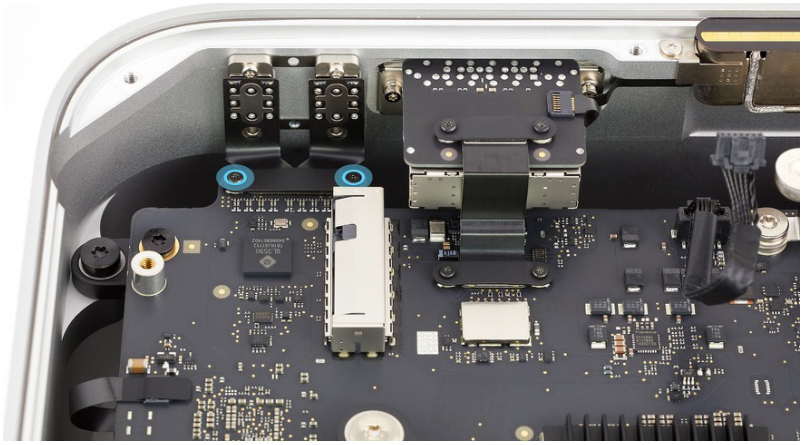
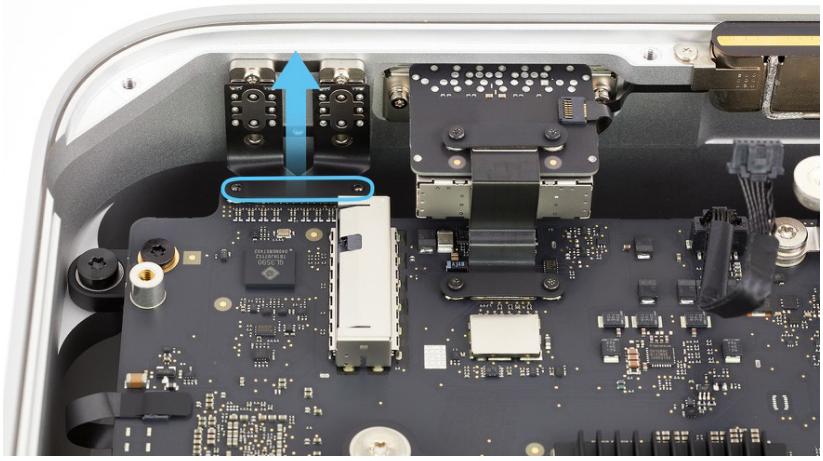
3. Use the T3 screwdriver to remove the two T3 screws (923-07105) from the front USB-C ports connector cowling.



4. Remove the front USB-C ports connector cowling and save it for reassembly.



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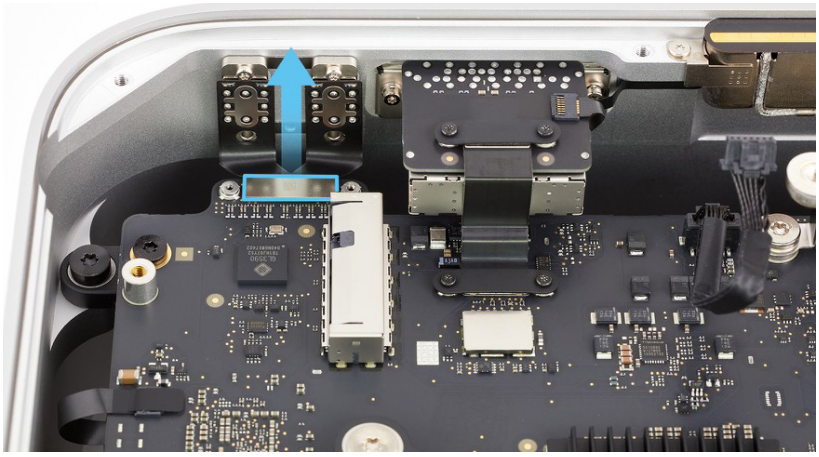
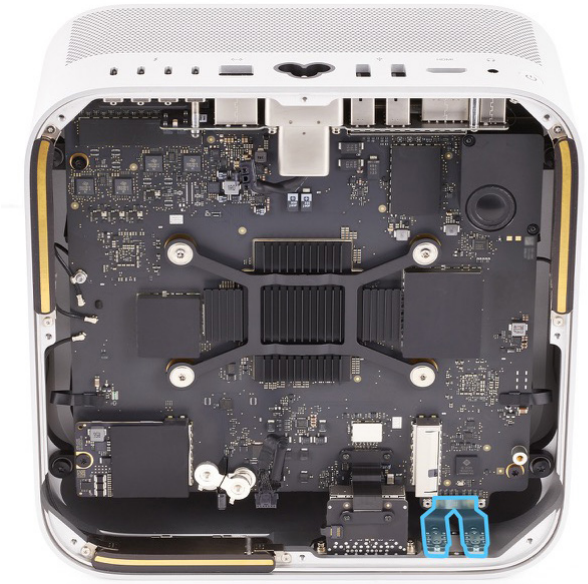
5. Use the flat end of the black stick to lift the end of the front USB-C flex cable off the connector.



6. Stand the computer on its front with the back ports facing up.



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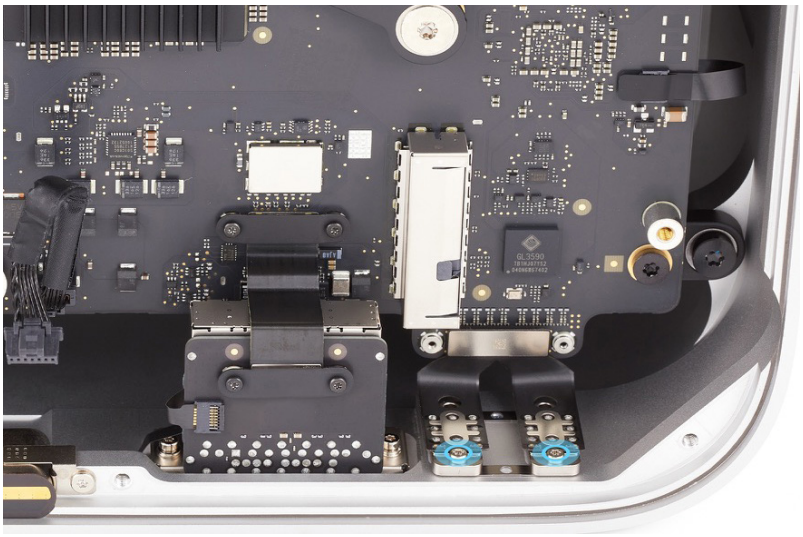
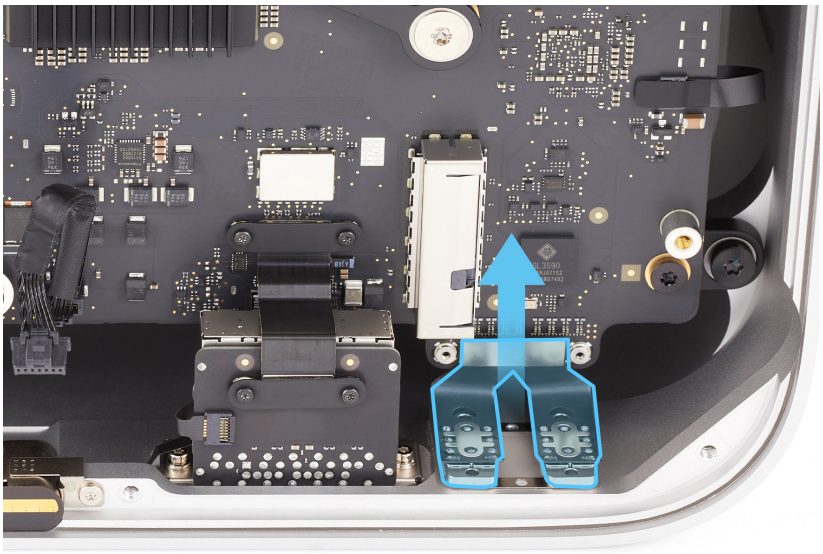
7. Use the T5 screwdriver to remove the two T5 screws (923-07093) from the front USB-C ports.



8. Lift the front USB-C ports out of the housing.



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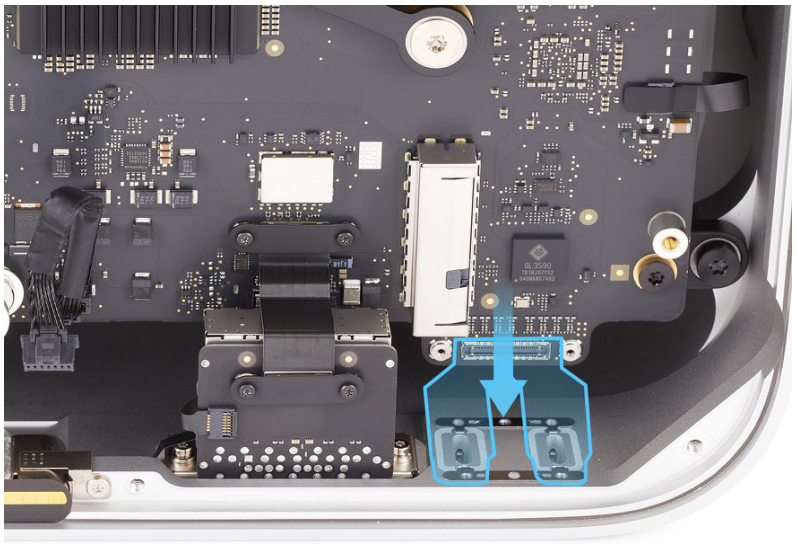
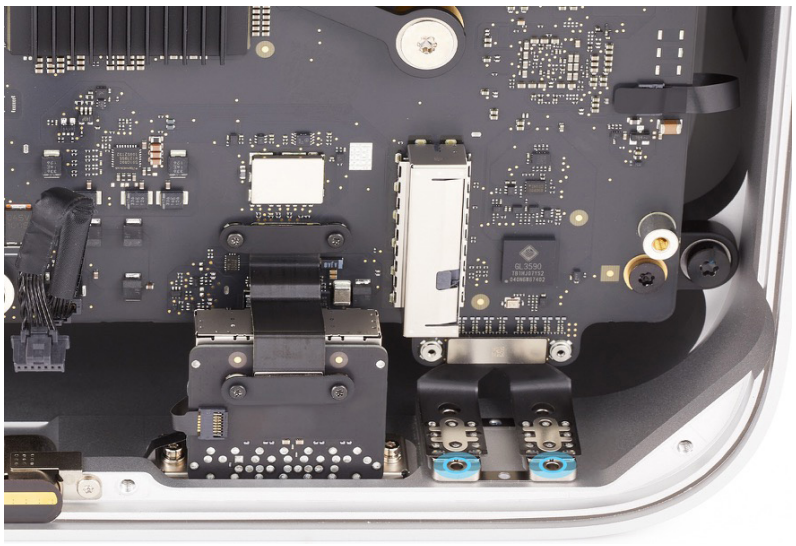
## Reassembly

1. Insert the front USB-C ports into the openings in the housing.



2. Use the T5 screwdriver to partially reinstall the two T5 screws (923-07093) into the front USB-C ports.



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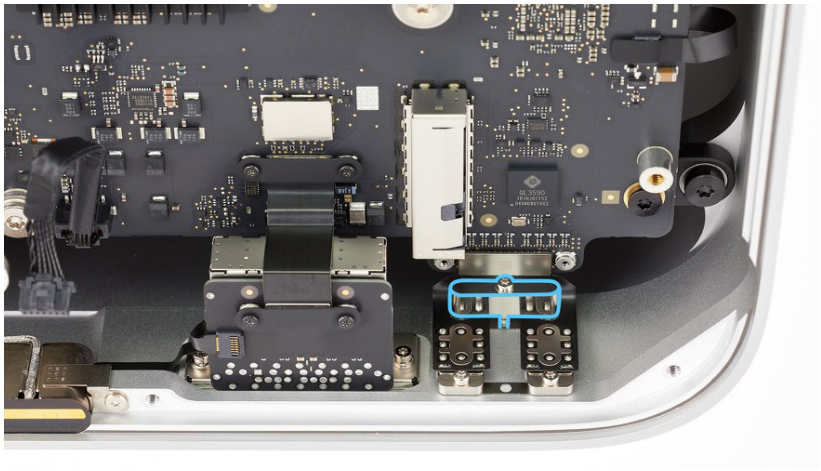
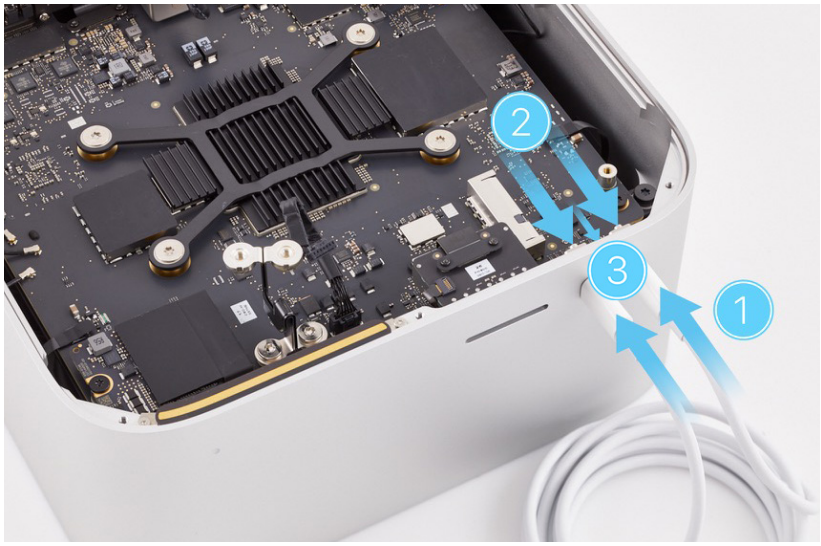
3. Align the two pins on the front USB-C bracket with the two holes in the front USB-C ports. Use the T5 screwdriver to partially reinstall the captive T5 screw on the bracket.



4. Position the computer as shown.

5. Plug both ends of the USB-C charge cable into the front USB-C ports (1) to ensure front USB-C ports alignment. Adjust the alignment of the USB-C ports until both ends of the USB-C charge cable are easy to insert and remove.

6. Use the T5 screwdriver to fully reinstall the two T5 screws (2) into the front USB-C ports and the captive T5 screw (3) into the front USB-C bracket.

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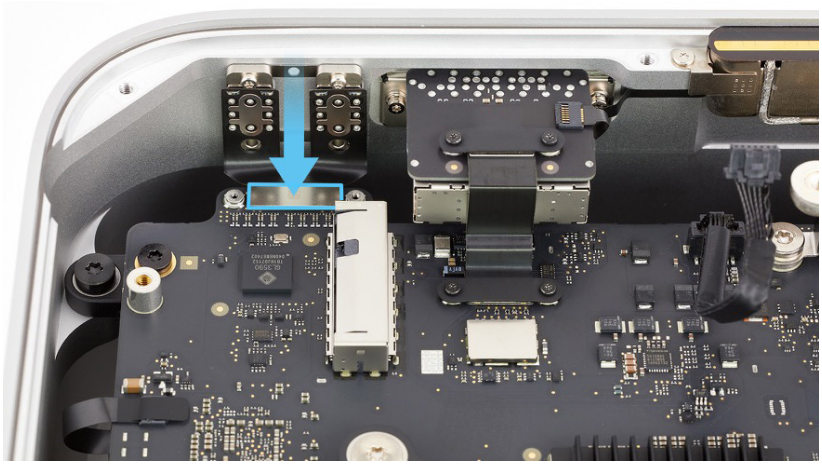
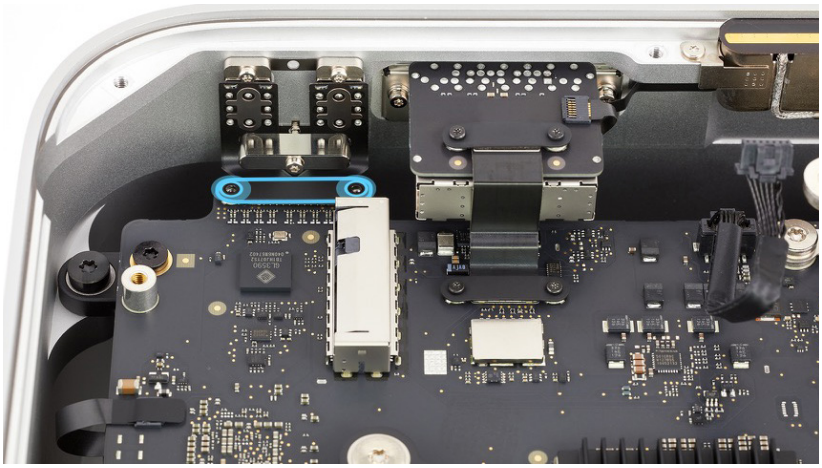
7. Rotate the computer so the back ports are facing you.

8. Press the end of the front USB-C flex cable to the connector.



9. Position the front USB-C ports connector cowling over the end of the front USB-C flex cable.

10. Use the green torque driver and Torx T3 half-moon bit to reinstall the two T3 screws (923-07105) into the cowling.



**Reinstall the following parts to complete reassembly:**

- Internal frame
- Power supply
- Bottom cover

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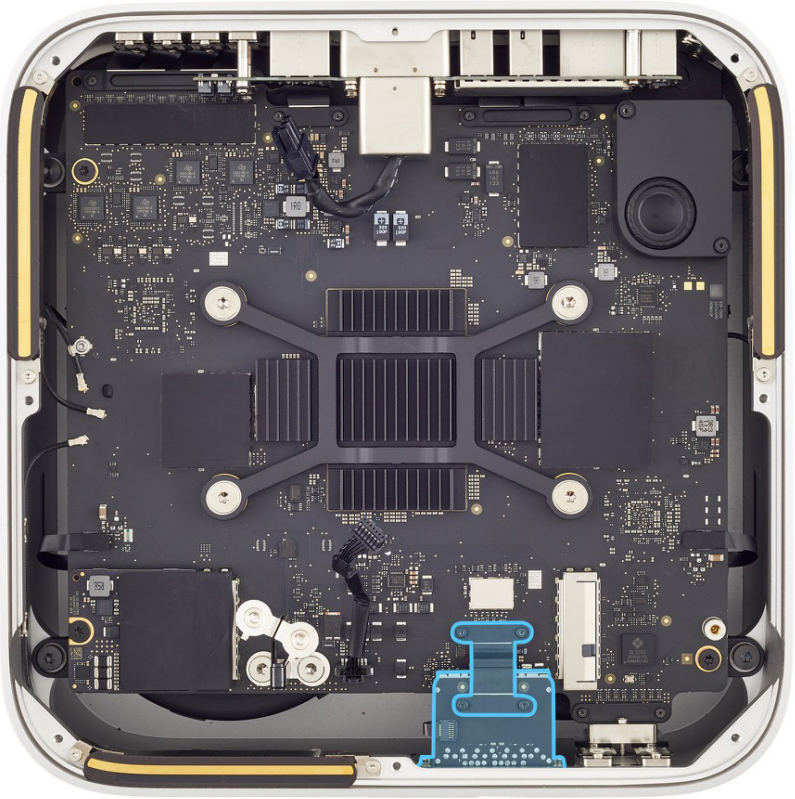
# SDXC Card Slot Board

## Before You Begin

**Remove the following parts before you begin:**

- Bottom cover
- Power supply
- Internal frame



### Tools

- Nylon probe (black stick)
- Torque driver (green, 0.45 kgf cm)
- Torx T3 half-moon bit
- Torx T3 screwdriver
- Torx T5 screwdriver

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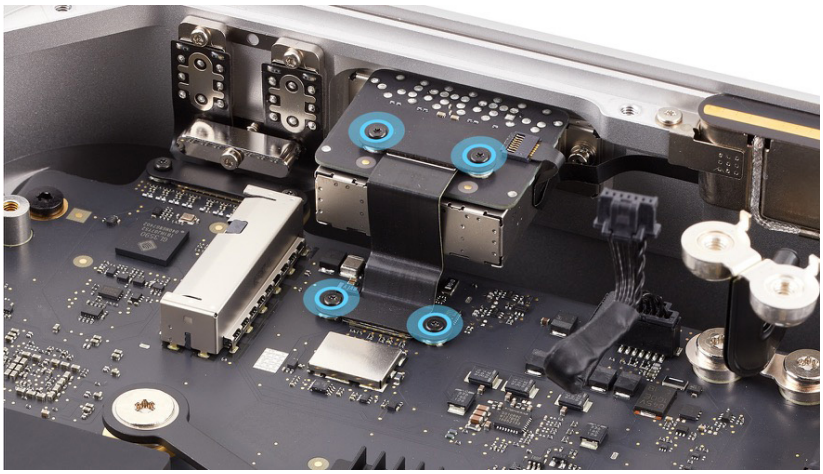
## Removal

1. Position the computer so the back ports are facing you.

2. Use the T3 screwdriver to remove the four T3 screws (923-07105) from the two SDXC card slot board connector cowlings.



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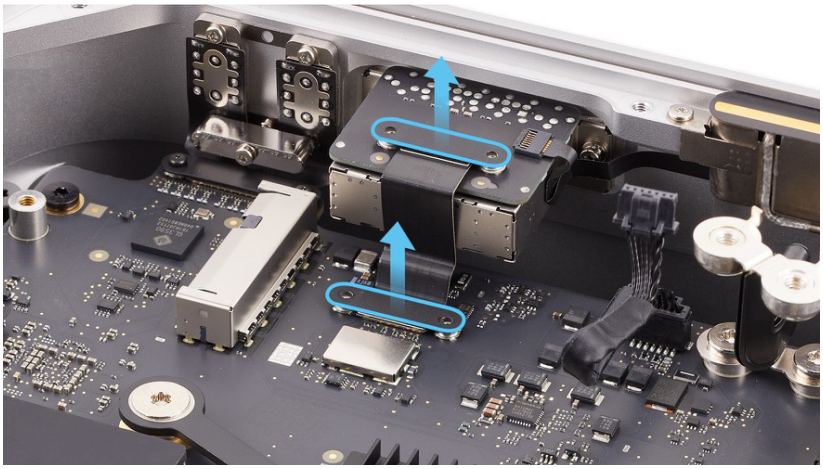
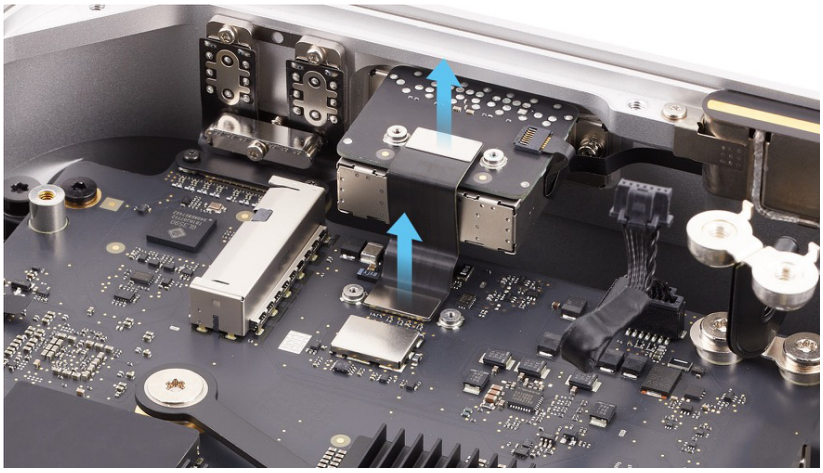
3. Remove the two cowlings and save them for reassembly.



4. Use the black stick to lift both ends of the SDXC card slot board flex cable off the connectors.

**Important**

Note the orientation of the cable for reassembly.



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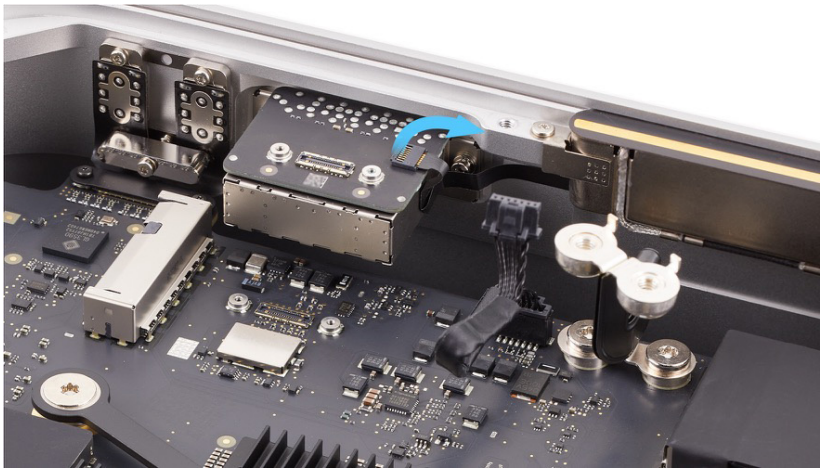
5. Use the flat end of the black stick to flip up the locking lever on the status indicator light flex cable.



6. Slide the end of the status indicator light flex cable out of the connector (1). Then gently peel the flex cable off the side of the SDXC card slot board (2).

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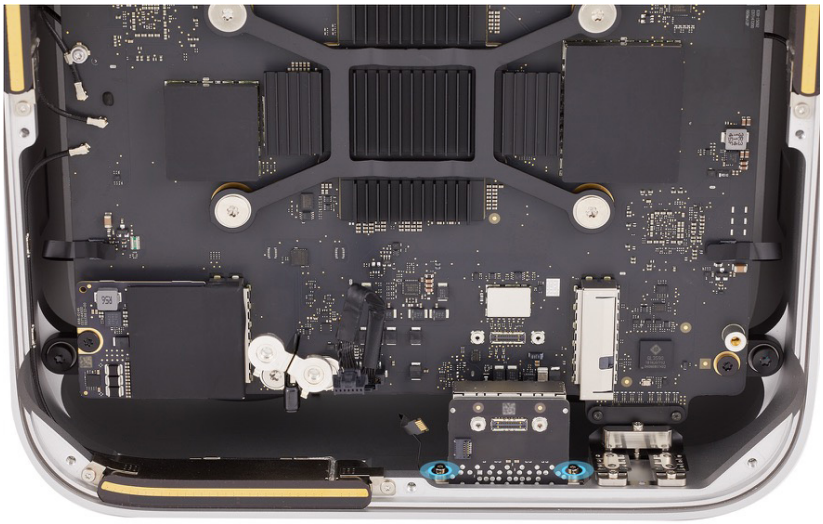
7. Stand the computer on its front with the back ports facing up.

8. Use the T5 screwdriver to remove the two T5 screws (923-07109) from the SDXC card slot board.



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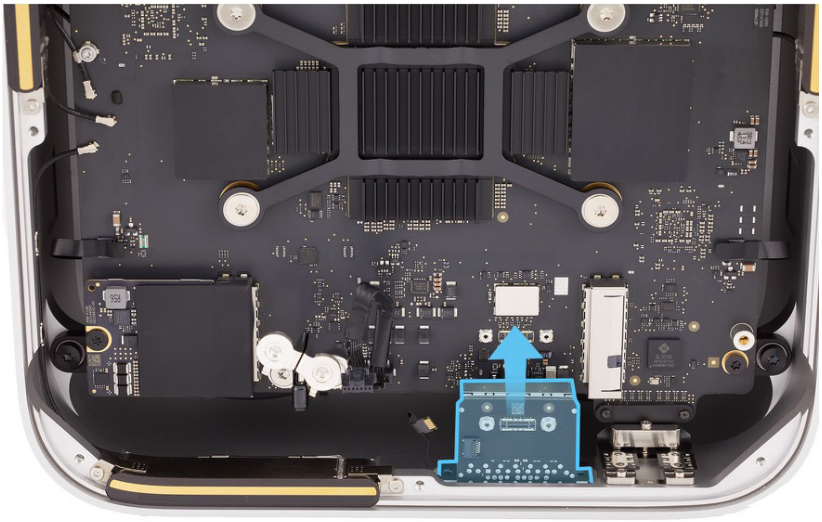
9. Lift the SDXC card slot board out of the housing.



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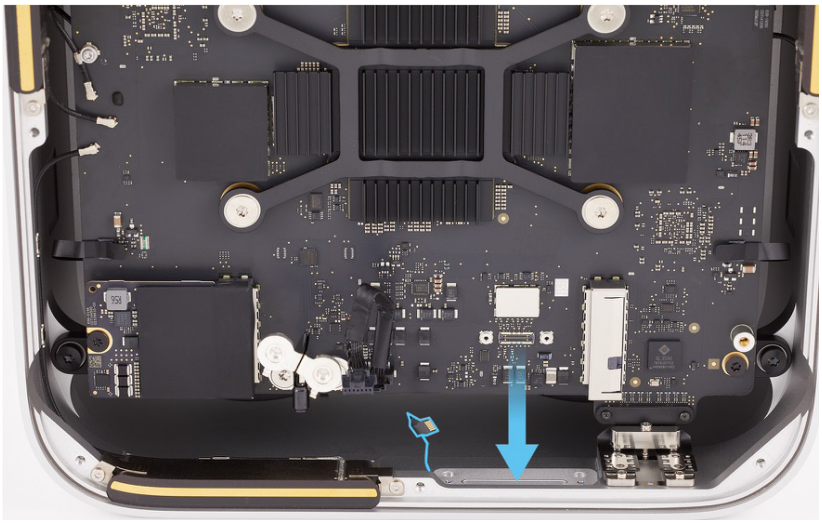
## Reassembly

1. Stand the computer on its front with the back ports facing up.

2. Align the two alignment pins on the front of the SDXC card slot board with the two holes in the housing. Ensure that the status indicator light flex cable doesn't get caught between the SDXC card slot board and the housing.



3. Use the T5 screwdriver to reinstall the two T5 screws (923-07109) into the SDXC card slot board.

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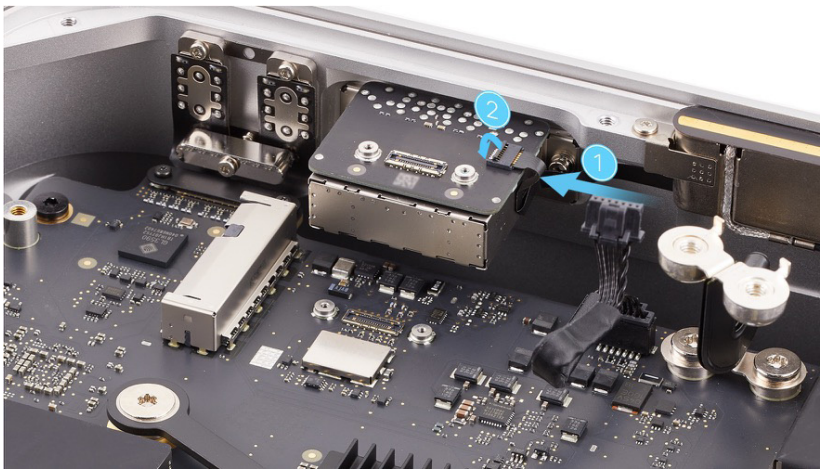
4. Place the computer as shown.

5. Slide the end of the status indicator light flex cable into the connector (1). Then flip down the locking lever (2). Press the status indicator light flex cable to adhere it to the side of the SDXC card slot board.

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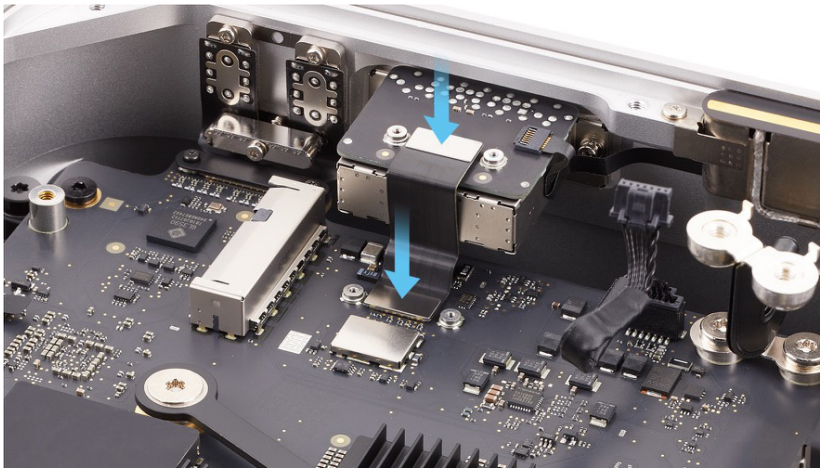
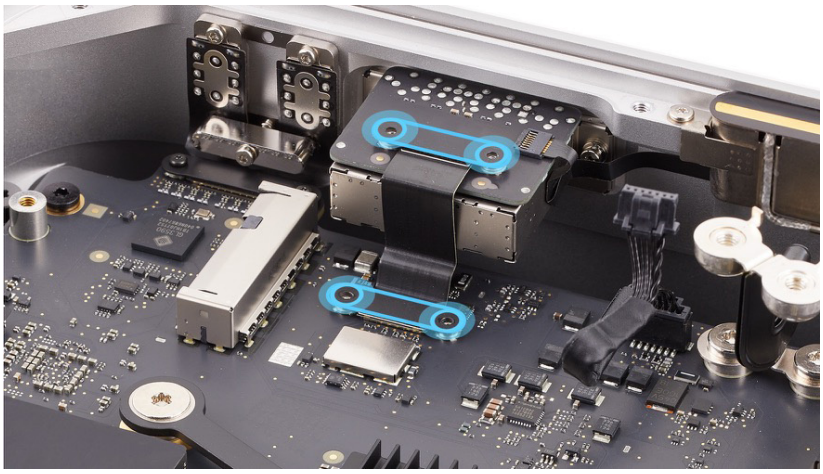
6. Position the ends of the SDXC card slot board flex cable over the connectors. Press the ends of the flex cable to the connectors.



7. Position the SDXC card slot board connector cowlings over the ends of the flex cable. Then use the green torque driver and Torx T3 half-moon bit to reinstall the four T3 screws (923-07105) into the two cowlings.



**Reinstall the following parts to complete reassembly:**

- Internal frame
- Power supply
- Bottom cover

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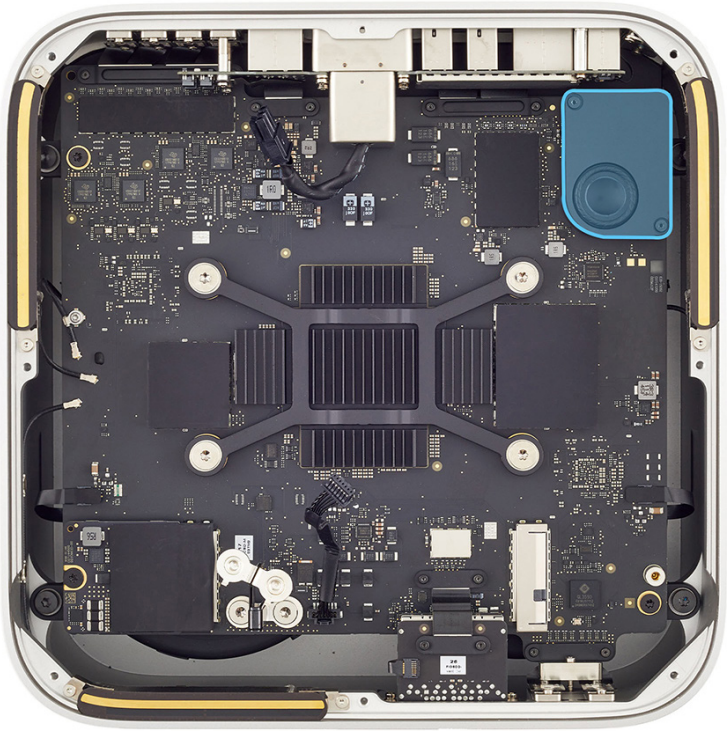
# Speaker

## Before You Begin

**Remove the following parts before you begin:**

- Bottom cover
- Power supply
- Internal frame



### Tools

- Adjustable torque driver (10-34 Ncm)
- Nylon probe (black stick)
- Torx T5 bit
- Torx T5 screwdriver

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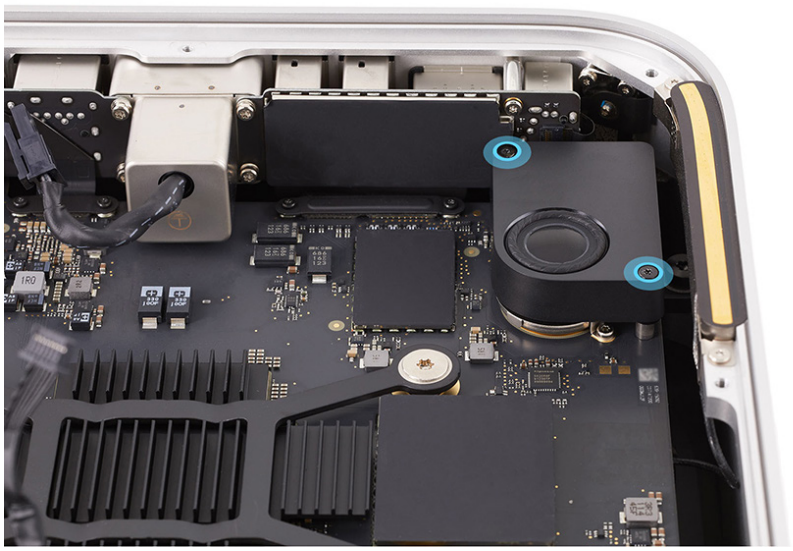
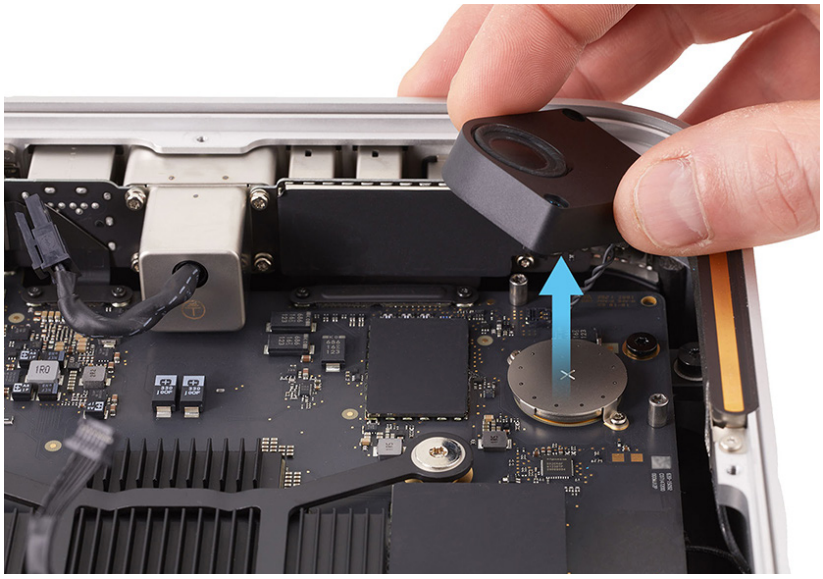
## Removal

1. Use the T5 screwdriver to remove the two T5 screws (923-07104) from the speaker.



2. Slightly lift the speaker. Use the flat end of the black stick to lift the end of the speaker flex cable off the connector on the logic board.



3. Lift the speaker out of the housing.

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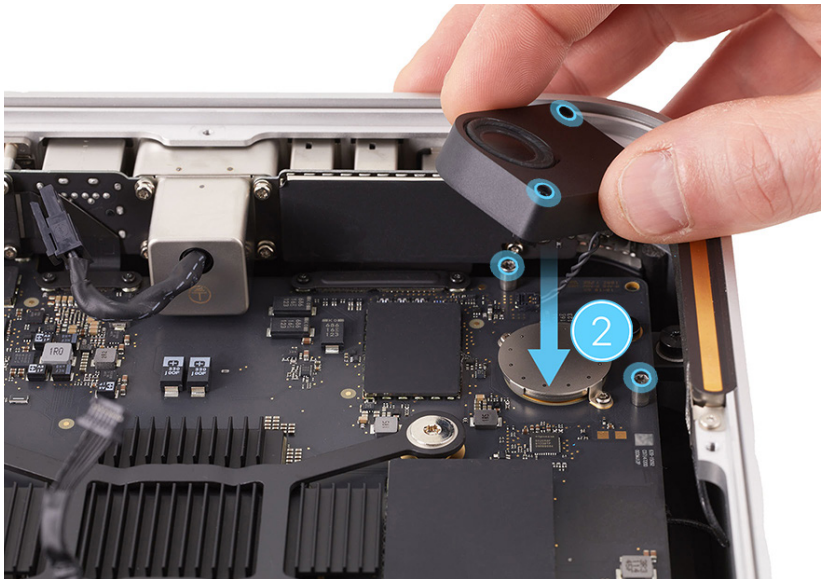
## Reassembly

1. Position the speaker over the logic board.

2. Use the flat end of the black stick to press the end of the speaker flex cable to the connector (1).

3. Align the screw holes in the speaker with the two speaker standoff screws on the logic board (2).

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4. Insert the Torx T5 bit into the 10–34 Ncm adjustable torque driver. Set the torque value to 13 Ncm.

5. Use the adjustable torque driver and Torx T5 bit to reinstall the two T5 screws (923-07104) into the speaker.

**Reinstall the following parts to complete reassembly:**

- Internal frame
- Power supply
- Bottom cover

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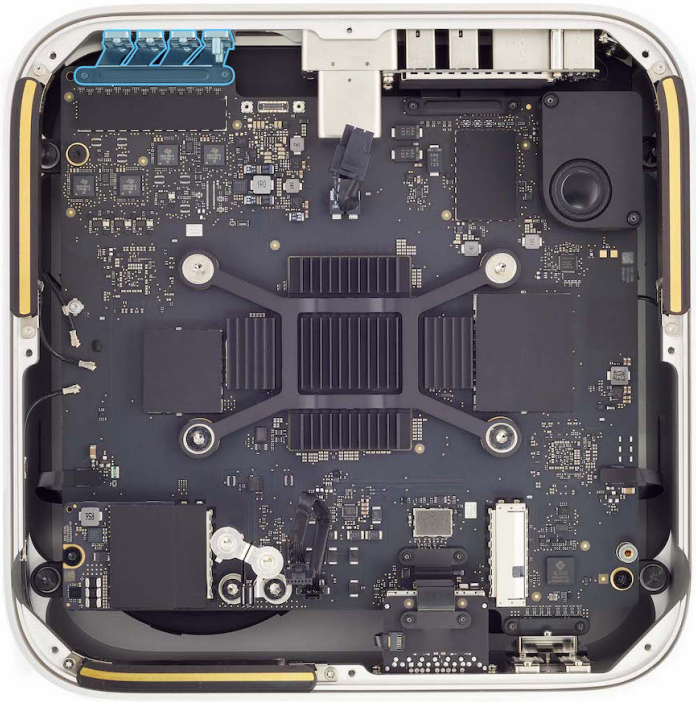
# Back Thunderbolt 4 Ports

## Before You Begin

**Remove the following parts before you begin:**

- Bottom cover
- Power supply
- Internal frame
- Ethernet board



### Tools

- Nylon probe (black stick)
- Torque driver (green, 0.45 kgf cm)
- Torx T3 half-moon bit
- Torx T3 screwdriver
- Torx T5 screwdriver
- Torx T7 screwdriver
- USB-C charge cable

**Note:** The images in this procedure show the removal and reinstallation of two back Thunderbolt 4 ports. However, the procedure to remove and reinstall one or both are the same.

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## Removal

1. Use the T3 screwdriver to remove the two T3 screws (923-07105) from the back Thunderbolt 4 ports connector cowling.

2. Remove the cowling and save it for reassembly.

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3. Use the black stick to lift the ends of the back Thunderbolt 4 ports flex cables off the connectors.

4. Stand the computer on its back with the front ports facing up.

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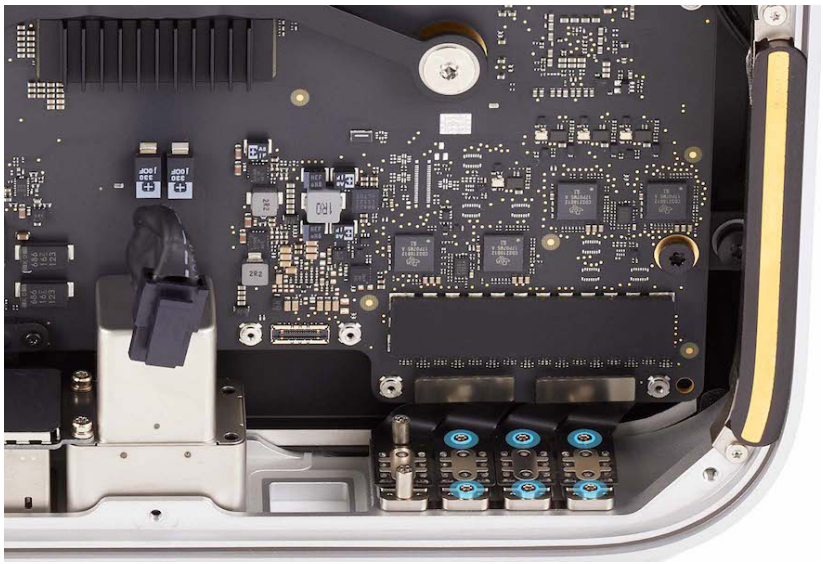
5. Use the T5 screwdriver to remove the six T5 screws (923-07093) from the back Thunderbolt 4 ports.



6. Use the T7 screwdriver to remove the two T7 standoff screws (923-07103) from the back Thunderbolt 4 ports.

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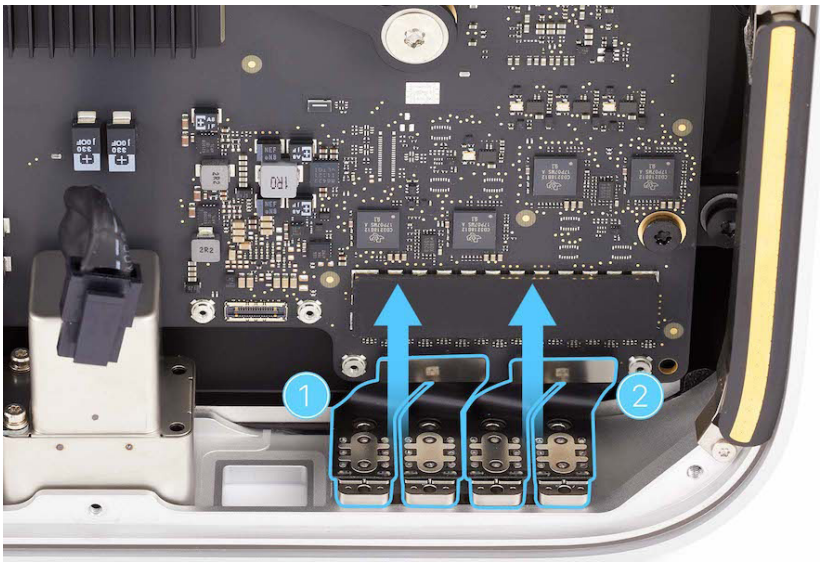
7. Lift the back Thunderbolt 4 ports out of the housing.

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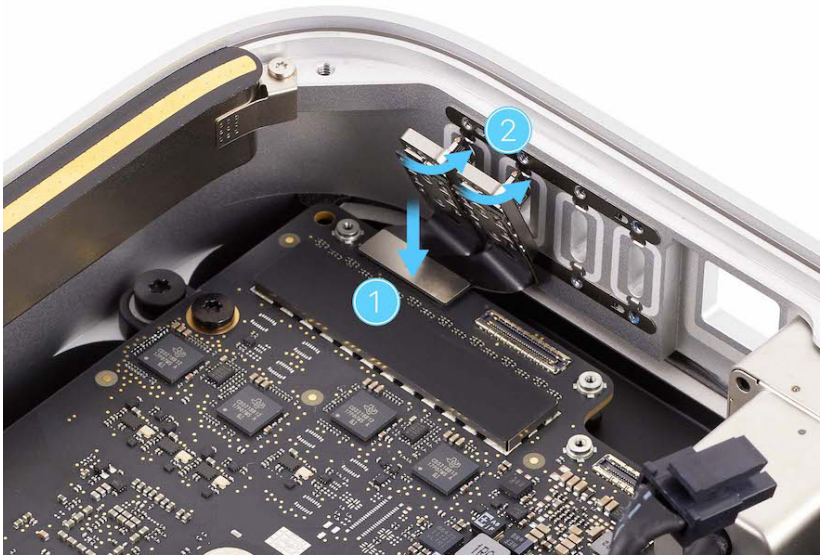
## Reassembly

1. Position the computer as shown.

2. Position the back Thunderbolt 4 ports in the housing and press the end of the back Thunderbolt 4 ports flex cable to the connector (1). Then insert the back Thunderbolt 4 ports into the opening in the housing (2).

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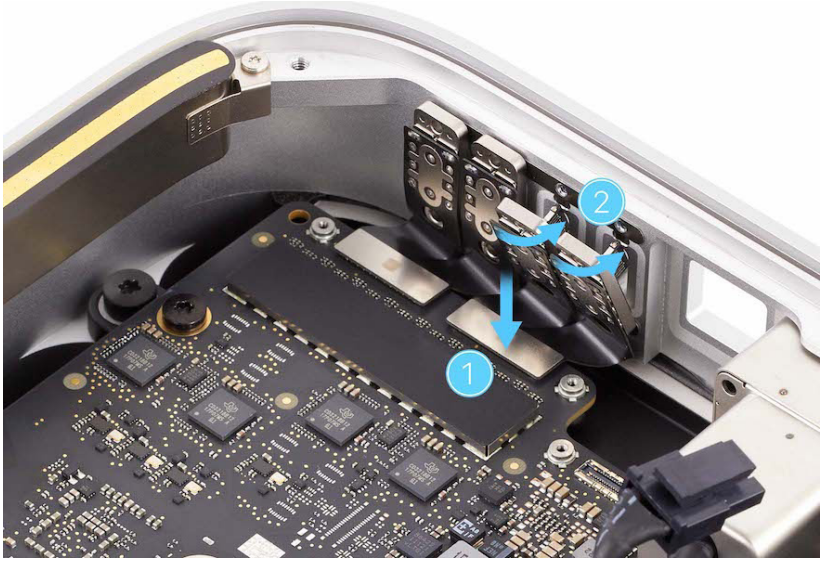
3. Position the back Thunderbolt 4 ports in the housing and press the end of the back Thunderbolt 4 ports flex cable to the connector (1). Then insert the back Thunderbolt 4 ports into the opening in the housing (2).




4. Stand the computer on its back with the front ports facing up.

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5. Use the T7 screwdriver to partially reinstall the two T7 standoff screws (923-07103) into the back Thunderbolt 4 ports.

6. Use the T5 screwdriver to partially reinstall the six T5 screws (923-07093) into the back Thunderbolt 4 ports.

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7. Position the computer as shown.

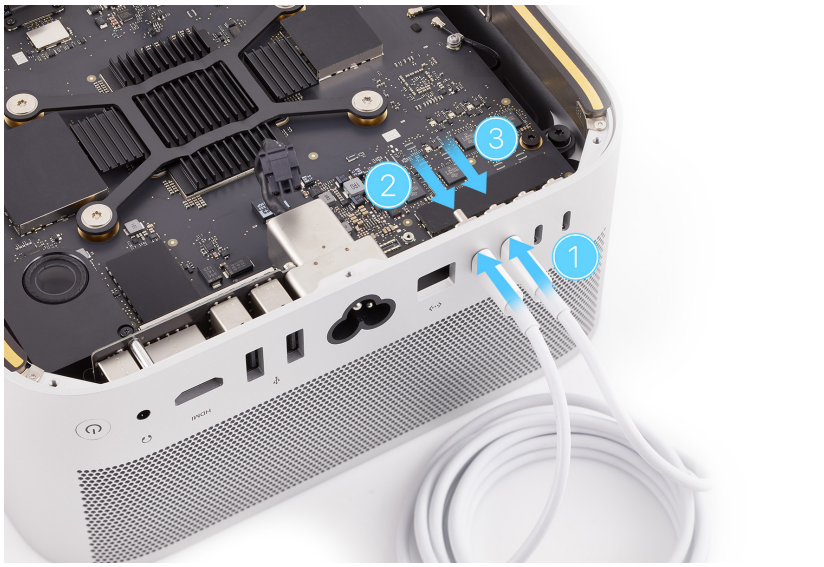
8. Plug both ends of the USB-C charge cable into two back Thunderbolt 4 ports (1) as shown to ensure back Thunderbolt 4 ports alignment. Adjust the alignment of the ports until both ends of the USB-C charge cable are easy to insert and remove.

9. Use the T5 screwdriver to fully reinstall four T5 screws into the back Thunderbolt 4 ports (2).

10. Plug both ends of the USB-C charge cable into two back Thunderbolt 4 ports (1) as shown to ensure back Thunderbolt 4 ports alignment. Adjust the alignment of the ports until both ends of the USB-C cable are easy to insert and remove.

11. Use the T7 screwdriver to fully reinstall the two T7 standoff screws into the back Thunderbolt 4 ports (2).

12. Use the T5 screwdriver to fully reinstall two T5 screws into the back Thunderbolt 4 ports (3).

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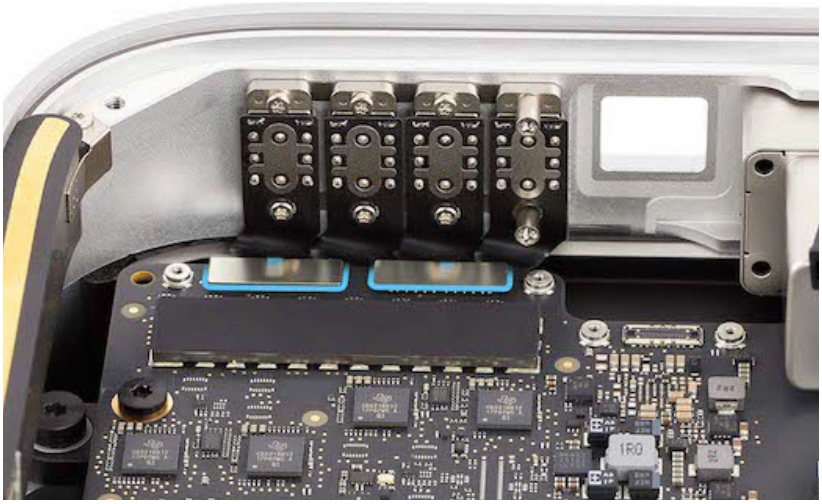
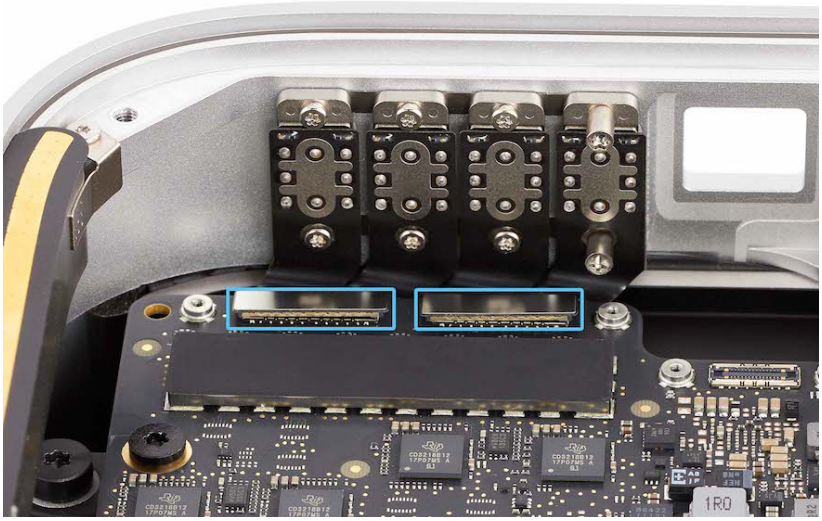
13. Press evenly along the length of each connector to ensure that they're fully connected to the logic board.

**Correct connection**



**Incorrect connection**



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14. Position the back Thunderbolt 4 ports connector cowling over the ends of the back Thunderbolt 4 ports flex cables. Then use the green torque driver and Torx T3 half-moon bit to reinstall the two T3 screws (923-07105) into the cowling.

**Reinstall the following parts to complete reassembly:**

- Ethernet board
- Internal frame
- Power supply
- Bottom cover

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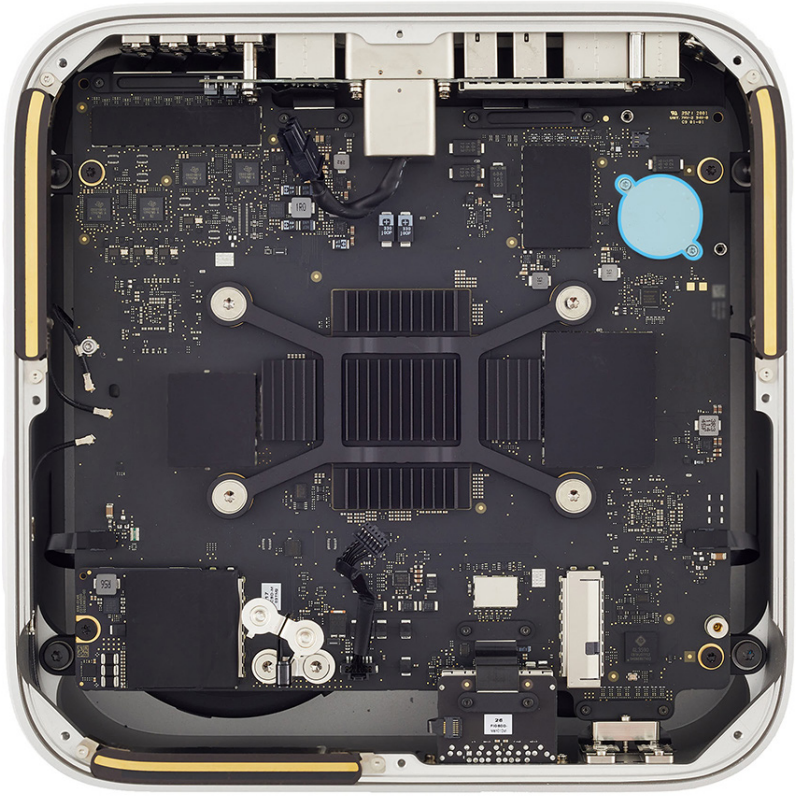
# Battery

## Before You Begin

**Remove the following parts before you begin:**

- Bottom cover
- Power supply
- Internal frame
- Speaker



**Tools**

- Nylon probe (black stick)
- Torx T5 screwdriver

**Important**

This model requires a BR2032 battery. Replacement batteries can be purchased from electronics supply retailers.

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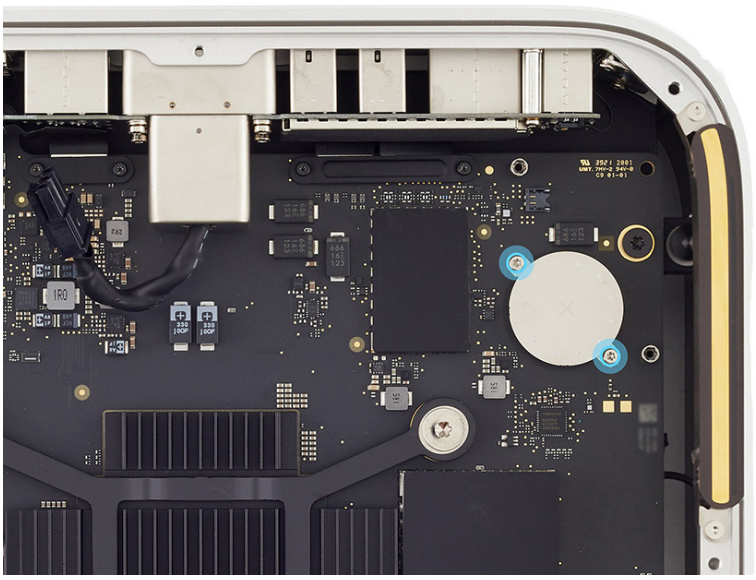
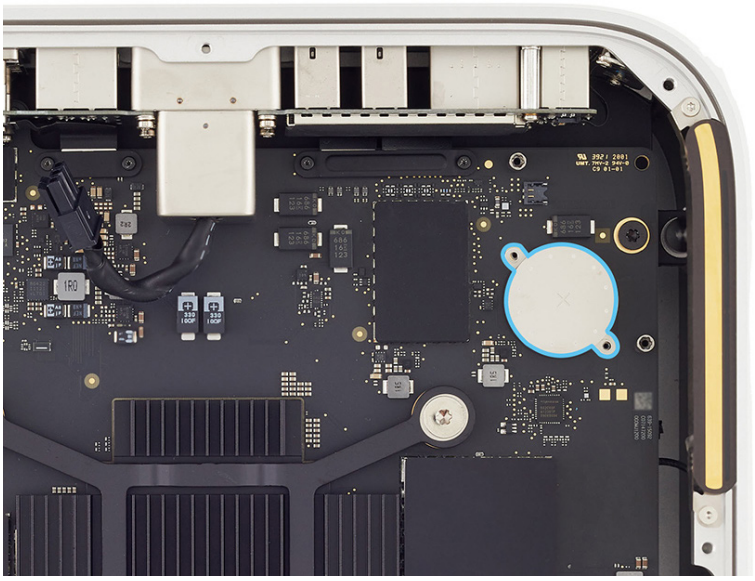
## Removal

1. Use the T5 screwdriver to remove the two T5 screws (923-07617) from the battery cover.



2. Lift the battery cover with the battery off the logic board.



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3. Turn over the battery cover and use the black stick to lift the battery out of the cover.

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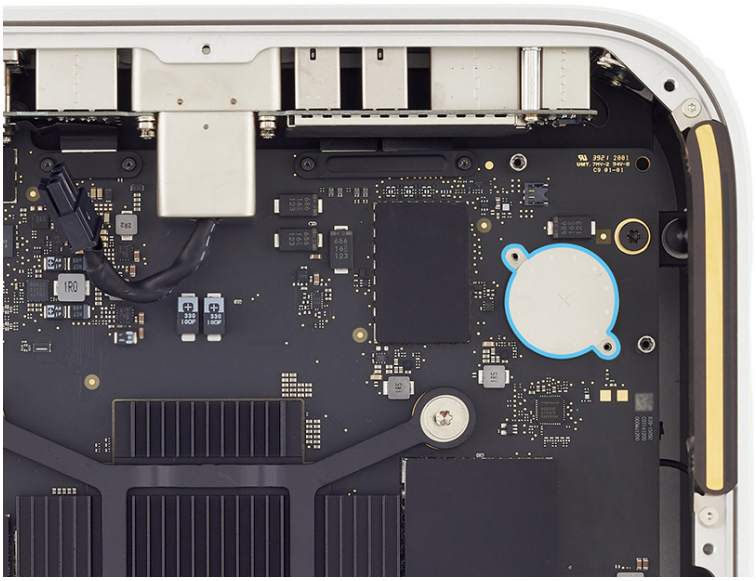
## Reassembly

**Warning**

Install only a BR2032 battery. There's a risk of explosion if the battery is installed incorrectly or replaced with an incorrect type of battery. Dispose of used batteries according to local environmental laws and guidelines.

1. Insert the battery into the battery cover (1) with the negative (–) side of the battery facing out (2).

2. Turn over the battery cover with the battery and position it on the logic board. Align the screw cutouts in the battery cover with the screw holes in the logic board.



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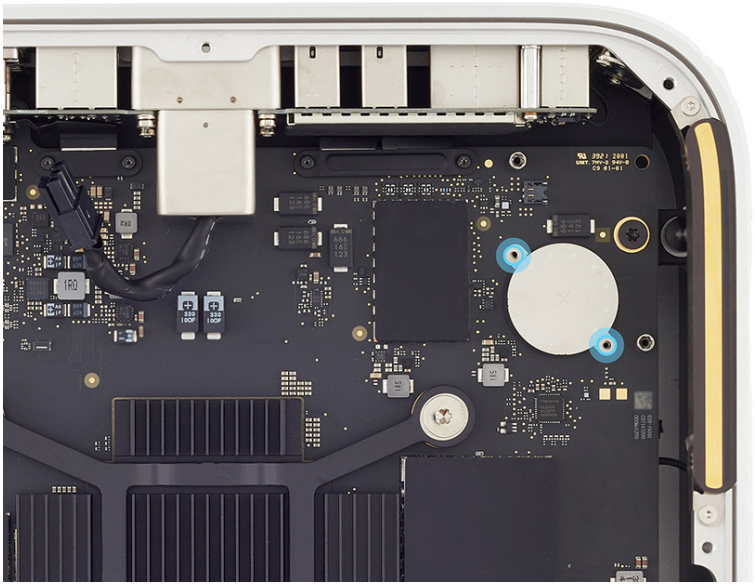
3. Use the T5 screwdriver to reinstall the two T5 screws (923-07617) into the battery cover.



**Reinstall the following parts to complete reassembly:**

- Speaker
- Internal frame
- Power supply
- Bottom cover

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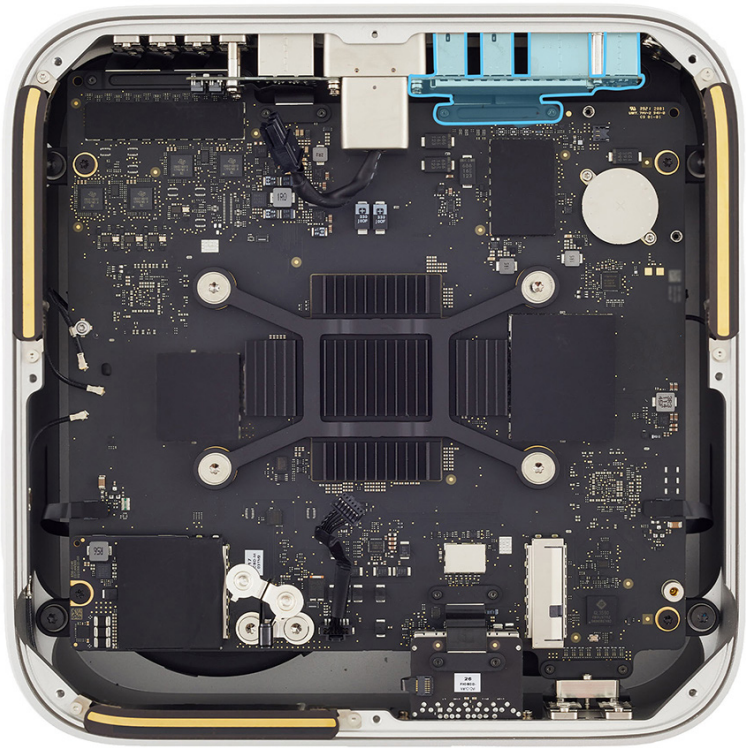
# Combination Input/Output Board

## Before You Begin

**Remove the following parts before you begin:**

- Bottom cover
- Power supply
- Internal frame
- Speaker



### Tools

- Adjustable torque driver (10–34 Ncm)
- HDMI cable
- Nylon probe (black stick)
- Torque driver (green, 0.45 kgf cm)
- Torx T3 half-moon bit
- Torx T3 screwdriver
- Torx T4 screwdriver
- Torx T6 screwdriver
- Torx T8 bit
- Torx T8 screwdriver

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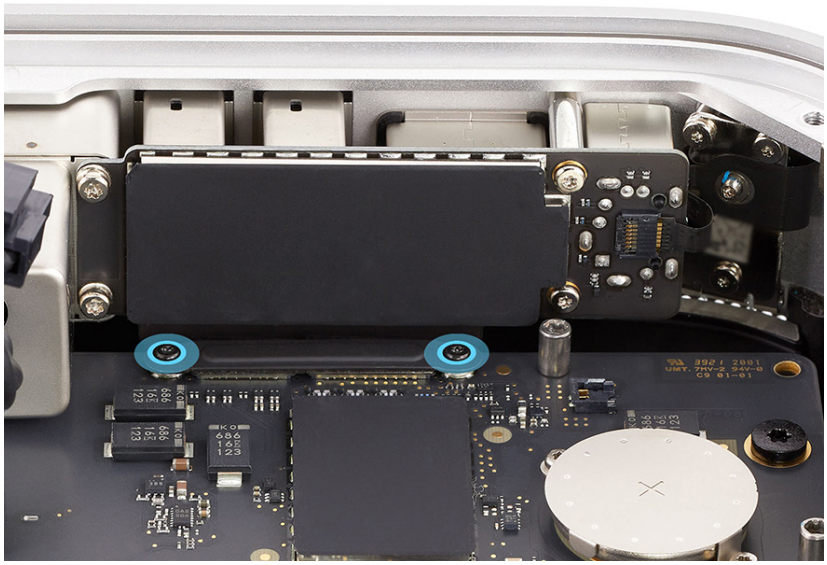
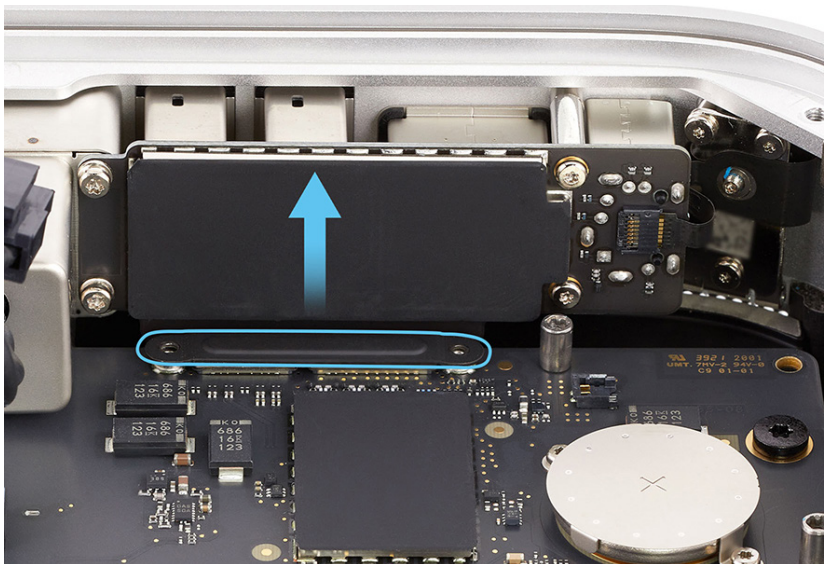
## Removal

1. Use the T3 screwdriver to remove the two T3 screws (923-07105) from the combination input/output (I/O) board connector cowling.



2. Remove the combination I/O board connector cowling and save it for reassembly.



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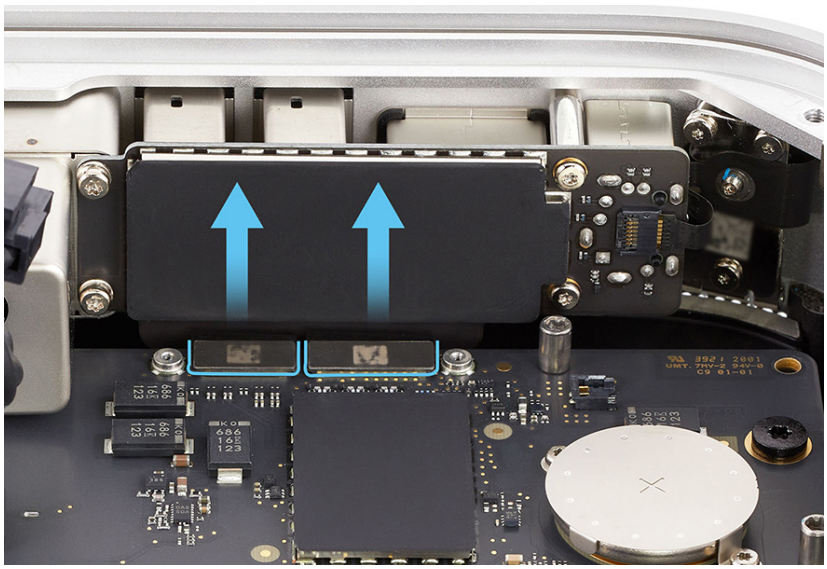
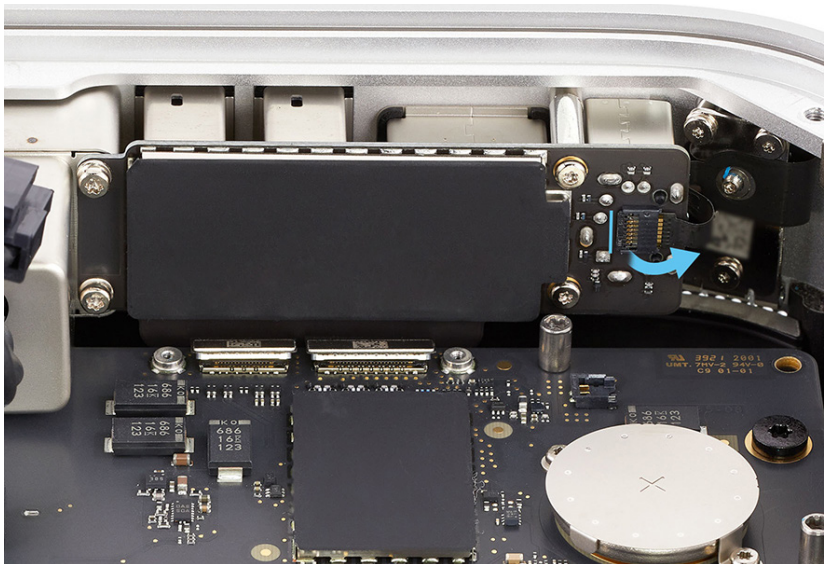
3. Use the black stick to lift the ends of the USB-A flex cable and HDMI flex cable off the connectors.



4. Use the flat end of the black stick to flip up the locking lever on the power button flex cable.



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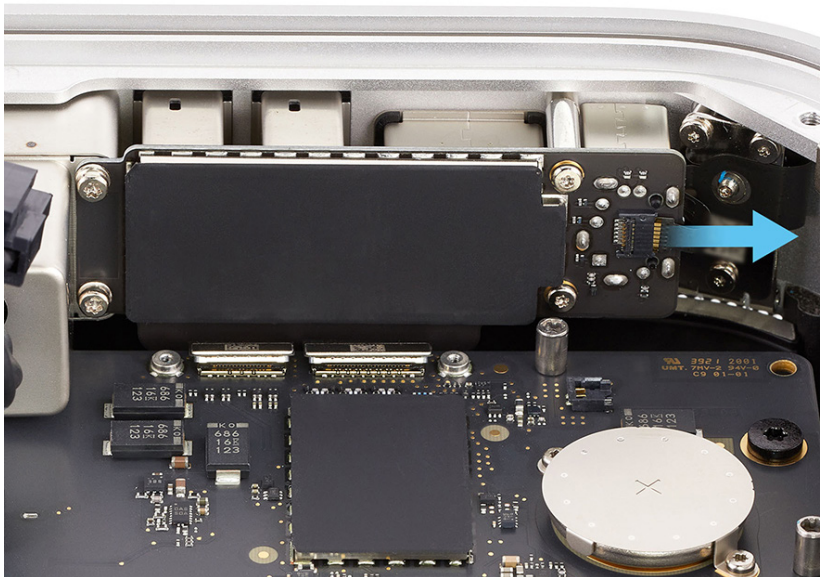
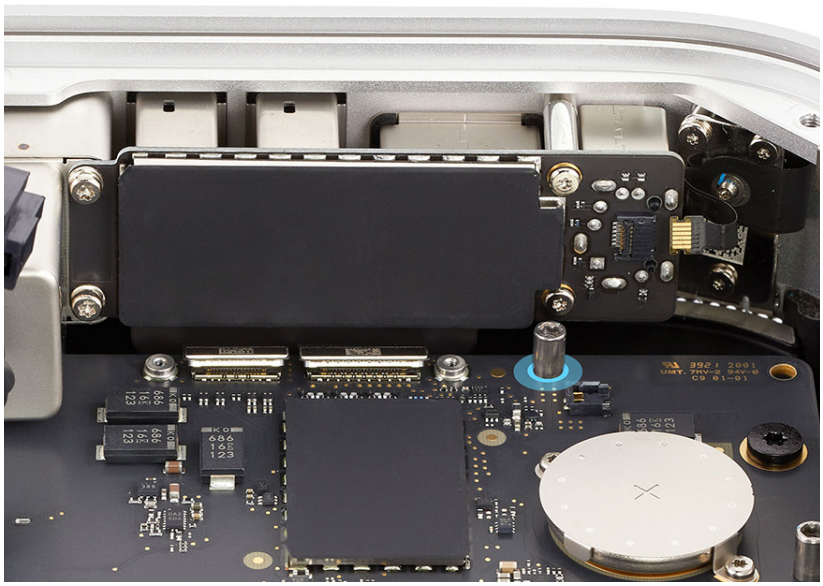
5. Slide the end of the power button flex cable out of the connector.

6. Gently peel the power button flex cable off the side of the combination I/O board.



7. Use the T8 screwdriver to remove one T8 speaker standoff screw (923-07108) from the logic board.

   **Note**: This speaker standoff screw supports the speaker.



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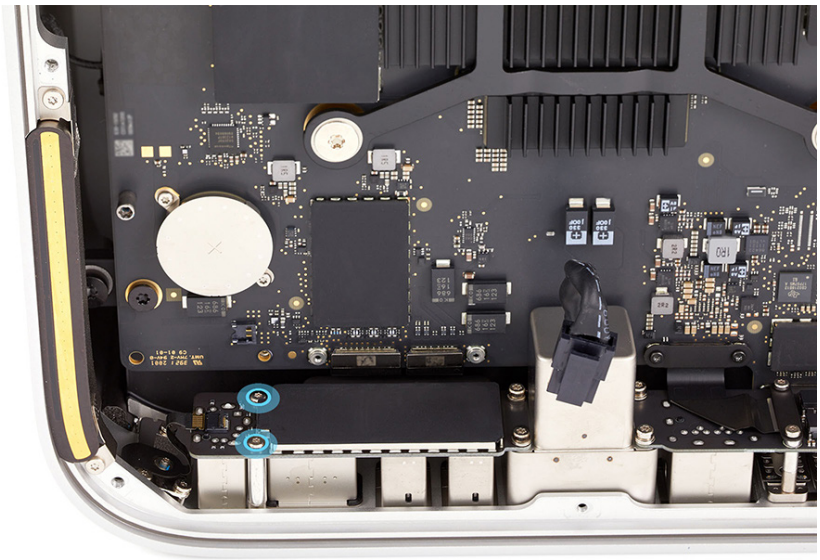
8. Stand the computer on its back with the front ports facing up.

9. Use the T4 screwdriver to remove the two T4 screws (923-07111) from the combination I/O board.



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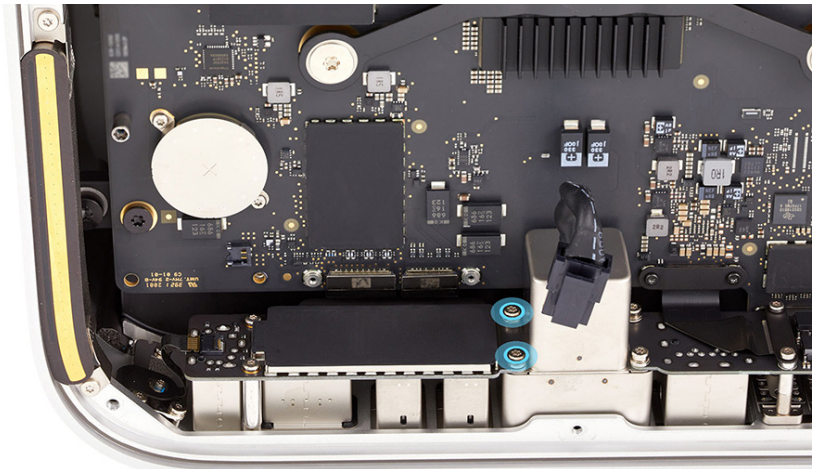
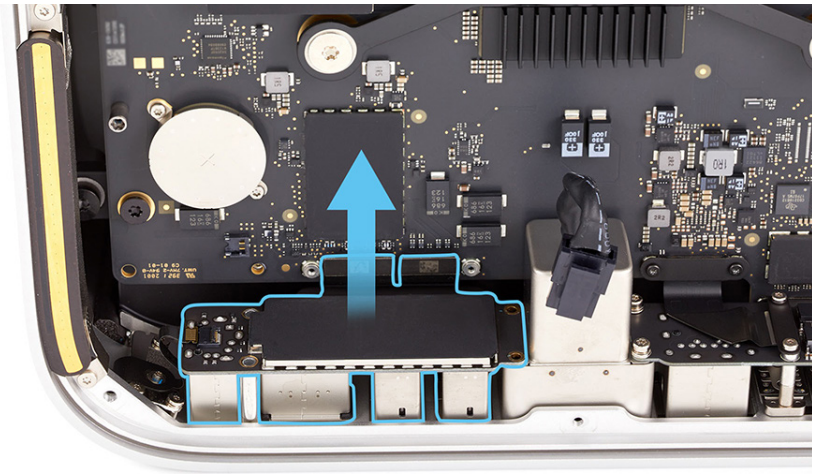
10. Use the T6 screwdriver to remove the two T6 screws (923-07100) from the combination I/O board and power cord port.



11. Lift the combination I/O board out of the housing.

    **Note**: The USB-A flex cable and HDMI flex cable are still attached to the combination I/O board.



12. If you're removing the combination I/O board as part of another procedure, skip to reassembly step 5. If you're installing a replacement combination I/O board, continue to step 13.

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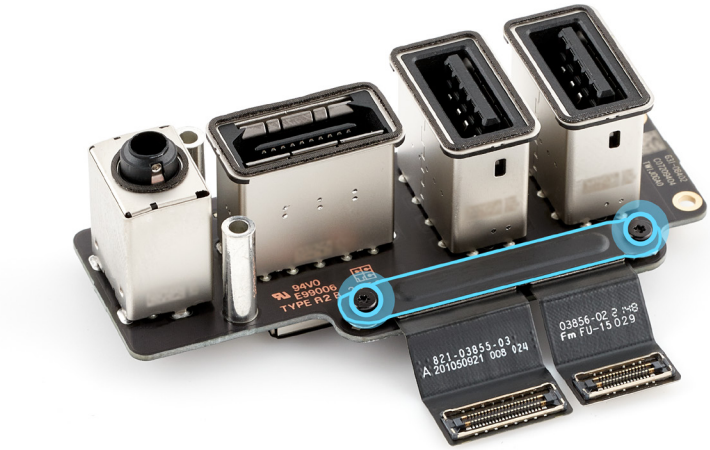
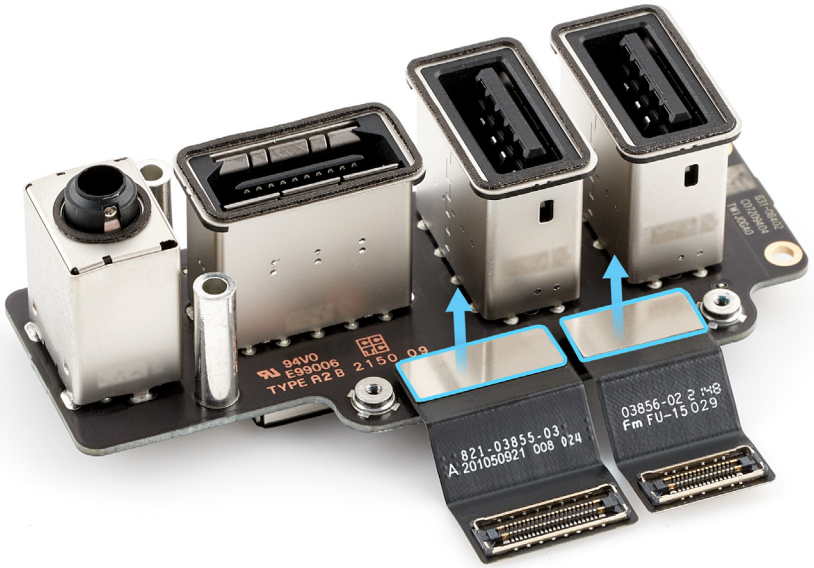
13. Place the combination I/O board as shown.

14. Use the T3 screwdriver to remove the two T3 screws (923-07105) from the second combination I/O board connector cowling on the combination I/O board. Remove the cowling and save it for reassembly.



15. Use the black stick to lift the ends of the USB-A flex cable and HDMI flex cable off the connectors. Save the flex cables for reassembly.



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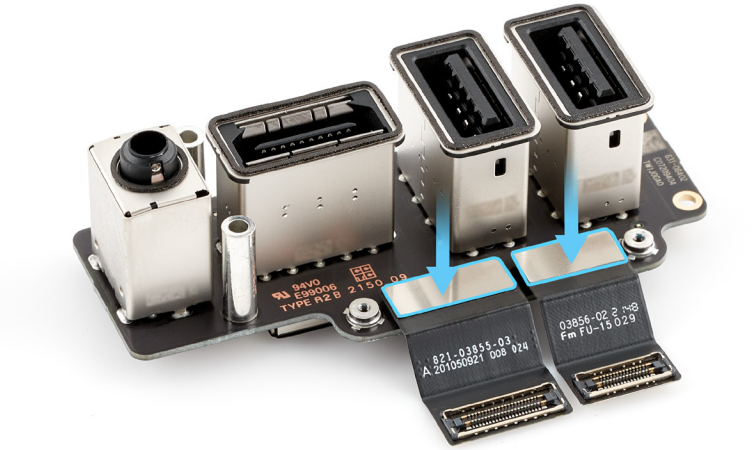
## Reassembly

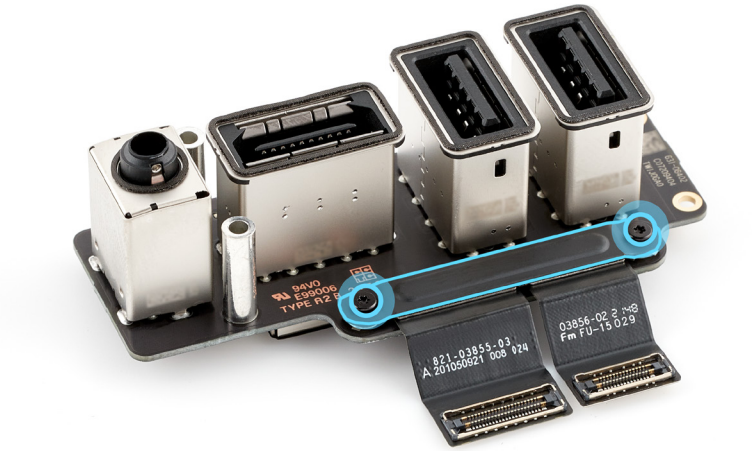
1. If you are installing a replacement combination I/O board, position it as shown.

2. Press the ends of the USB-A flex cable and HDMI flex cable to the connectors.



3. Position the second combination I/O board connector cowling over the connectors.

4. Use the green torque driver and Torx T3 half-moon bit to reinstall the two T3 screws (923-07105) into the combination I/O board connector cowling.



5. Stand the computer on its back with the front ports facing up.

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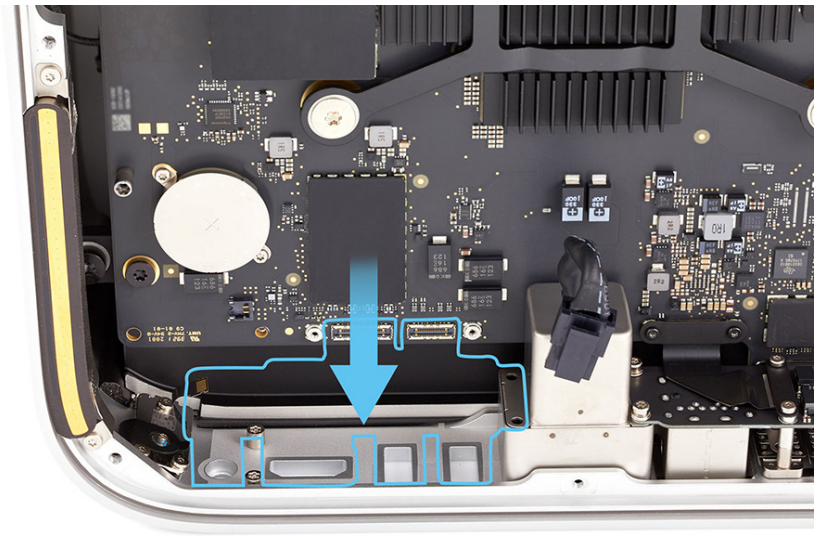
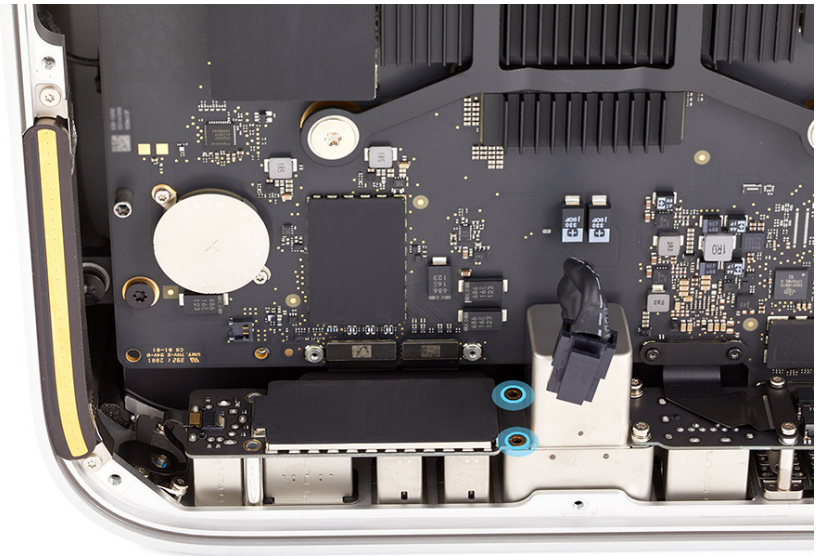
6. Position the combination I/O board in the housing.



7. Use the T6 screwdriver to partially reinstall the two T6 screws (923-07100) into the combination I/O board.

   **Note:** The screws pass through screw holes in the combination I/O board and power cord port and thread into the housing.



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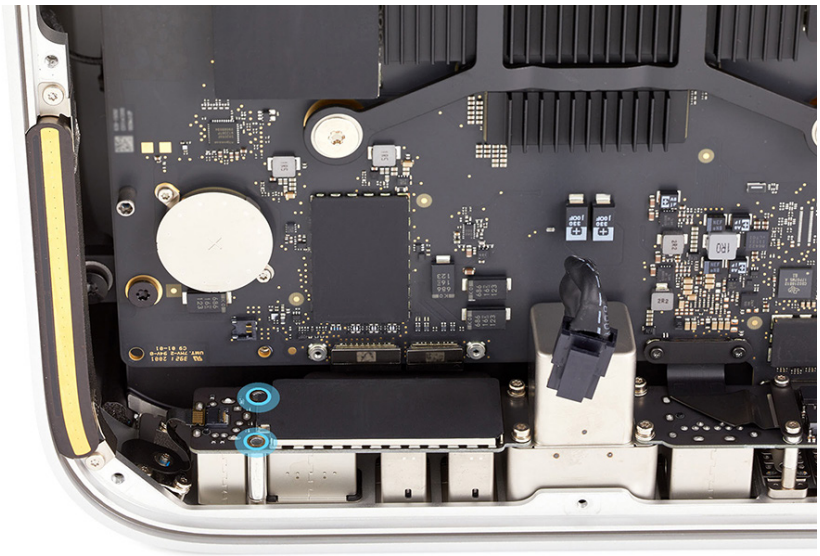
8. Use the T4 screwdriver to partially reinstall the two T4 screws (923-07111) into the combination I/O board.

   **Note:** The screws pass through screw holes in the combination I/O board and thread into the housing.



9. Position the computer as shown.

10. Plug an HDMI cable into the HDMI port to ensure combination I/O board alignment. Adjust the alignment of the combination I/O board until the end of the HDMI cable is easy to insert and remove.

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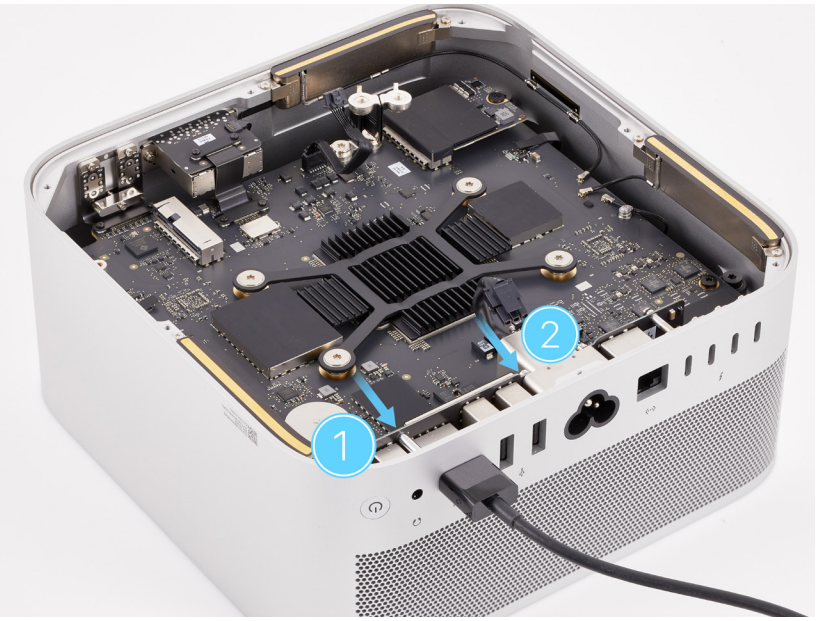
11. Use the T4 screwdriver to fully reinstall the two T4 screws into the combination I/O board (1).

12. Use the T6 screwdriver to fully reinstall the two T6 screws into the combination I/O board (2).




13. Rotate the computer so the front ports are facing you.

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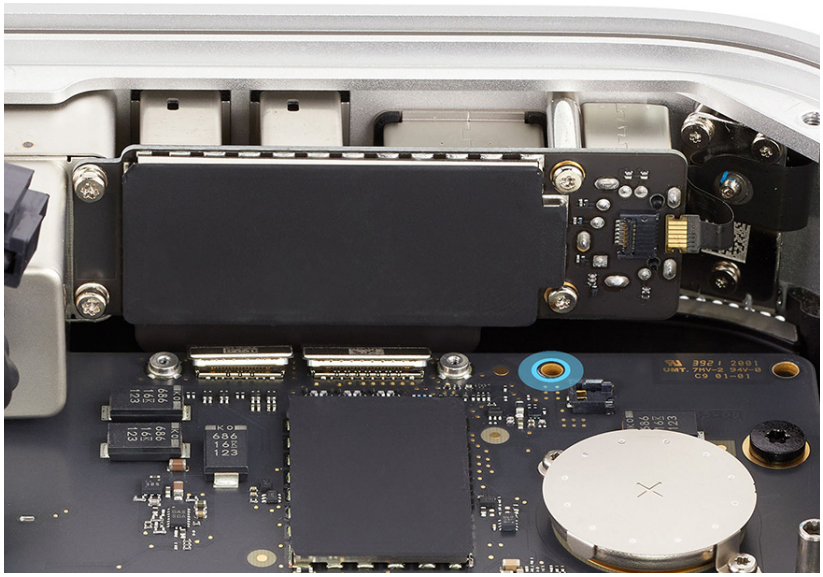
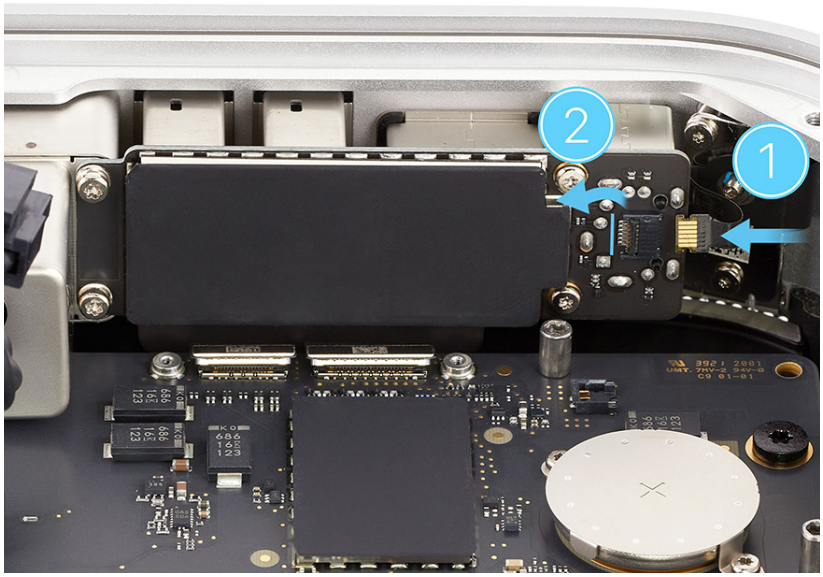
14. Insert the Torx T8 bit into the 10–34 Ncm adjustable torque driver. Set the torque value to 16 Ncm.

15. Use the torque driver to reinstall one T8 speaker standoff screw (923-07108) into the logic board.



16. Slide the end of the power button flex cable into the connector (1). Then flip down the locking lever (2).

17. Press the power button flex cable to the side of the combination I/O board.

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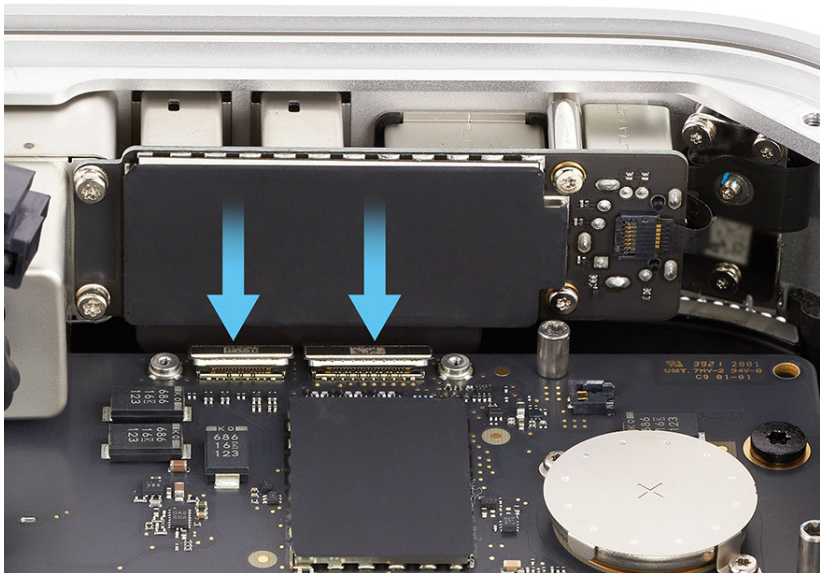
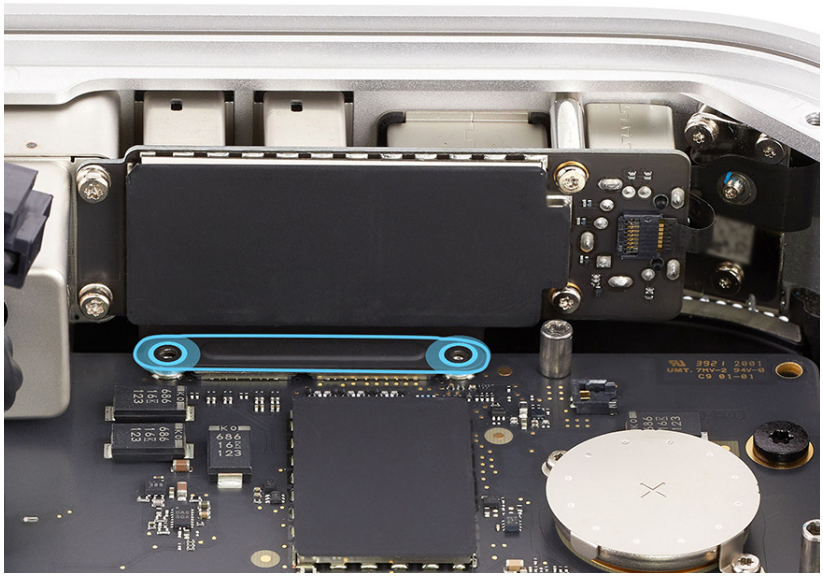
18. Press the ends of the combination I/O board flex cables to the connectors.



19. Position the combination I/O board connector cowling over the ends of the USB-A flex cable and HDMI flex cable. Then use the green torque driver and Torx T3 half-moon bit to reinstall the two T3 screws (923-07105) into the cowling.



**Reinstall the following parts to complete reassembly:**

- Speaker
- Internal frame
- Power supply
- Bottom cover

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# Power Cord Port

## Before You Begin

**Remove the following parts before you begin:**

- Bottom cover
- Power supply
- Internal frame
- Speaker
- Ethernet board
- Combination input/output board

### Tools

- No tools are required for this procedure.

**Caution**

The power cord port is held in place by the Ethernet board and the combination I/O board. Don't stand the computer on its side after those parts are removed. The power cord port could fall out and damage the logic board.

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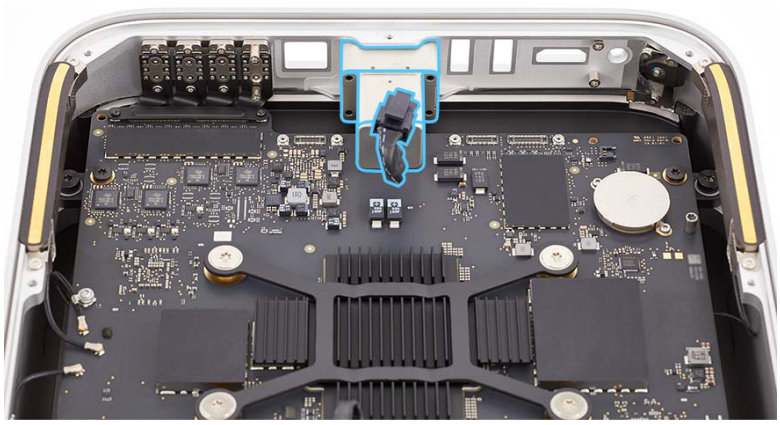
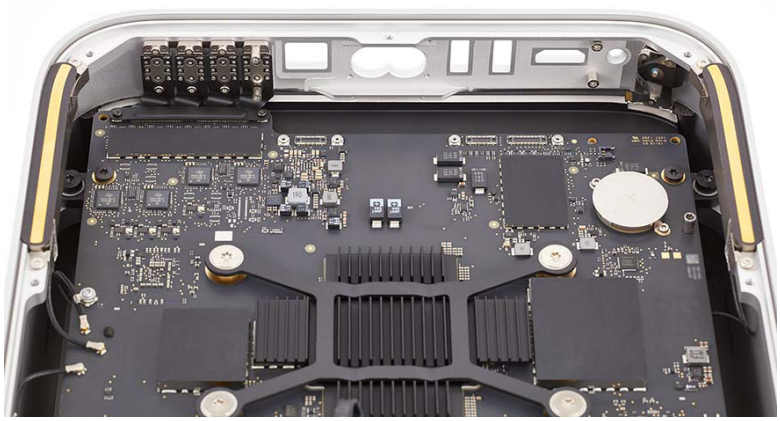
## Removal

1. Lift the power cord port out of the housing.





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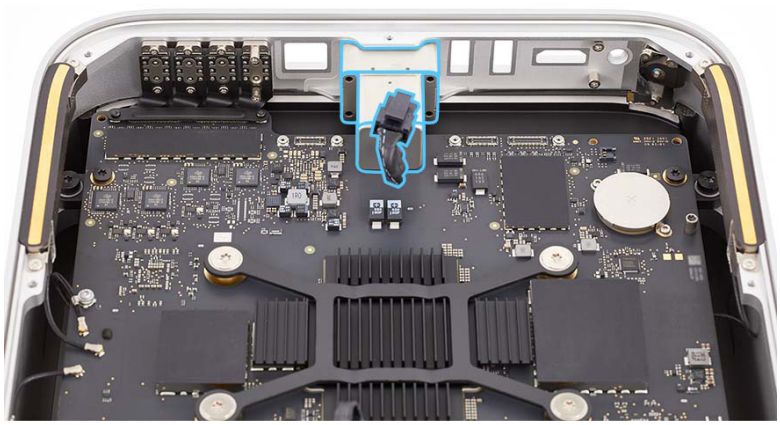
## Reassembly

1. Position the power cord port in the housing.



2. Reinstall the combination input/output board and Ethernet board to secure the power cord port in the housing.

**Reinstall the following parts to complete reassembly:**

- Speaker
- Internal frame
- Power supply
- Bottom cover

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# Power Button

## Before You Begin

**Remove the following parts before you begin:**

- Bottom cover
- Power supply
- Internal frame
- Speaker
- Combination input/output board

**Tools**

- Torx T3 screwdriver

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## Removal

1. Stand the computer on its back with the front ports facing up.

2. Use the T3 screwdriver to remove the three T3 screws (923-07541) from the front power button.

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3. Lift the power button out of the housing and save it for reassembly.

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## Reassembly

1. Insert the power button into the opening in the housing.

2. Use the T3 screwdriver to reinstall the three T3 screws (923-07541) into the power button.

**Reinstall the following parts to complete reassembly:**

- Combination input/output board
- Speaker
- Internal frame
- Power supply
- Bottom cover

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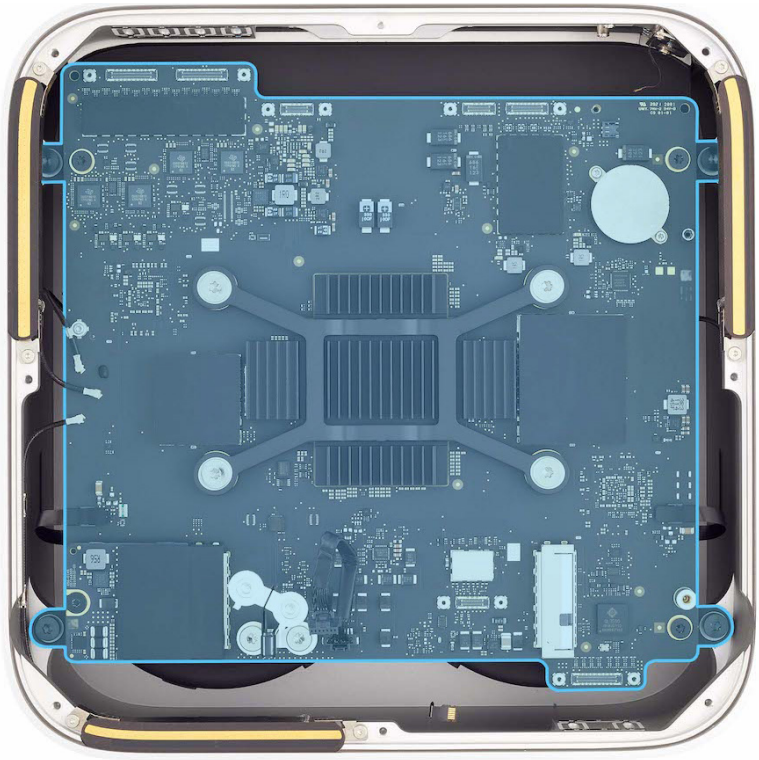
# Logic Board

## Before You Begin

**Remove the following parts before you begin:**

- Bottom cover
- Power supply
- Internal frame
- Front USB-C ports
- SDXC card slot board
- Ethernet board
- Back Thunderbolt 4 ports
- Speaker
- Combination input/output board
- Power cord port



### Tools

- Adjustable torque driver (0.3–1.2 Nm)
- Adjustable torque driver (1.2–3 Nm)
- Adjustable torque driver (10–34 Ncm)
- Antenna tool
- ESD-safe tweezers
- Kapton tape
- Nylon probe (black stick)
- Torx Plus 10IP 50 mm bit
- Torx T5 bit

**Caution**

This procedure requires System Configuration. After you've completed all removal and reassembly steps, learn how to initiate the System Configuration process at support.apple.com/self-service-repair.

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## Removal

1. Place the computer with the front ports facing you.

2. Insert the Torx T5 bit into the 10–34 Ncm adjustable torque driver. Set the torque value to 11.5 Ncm.

3. Use the adjustable torque driver and Torx T5 bit to remove the two T5 screws (923-07101) from antenna 1.

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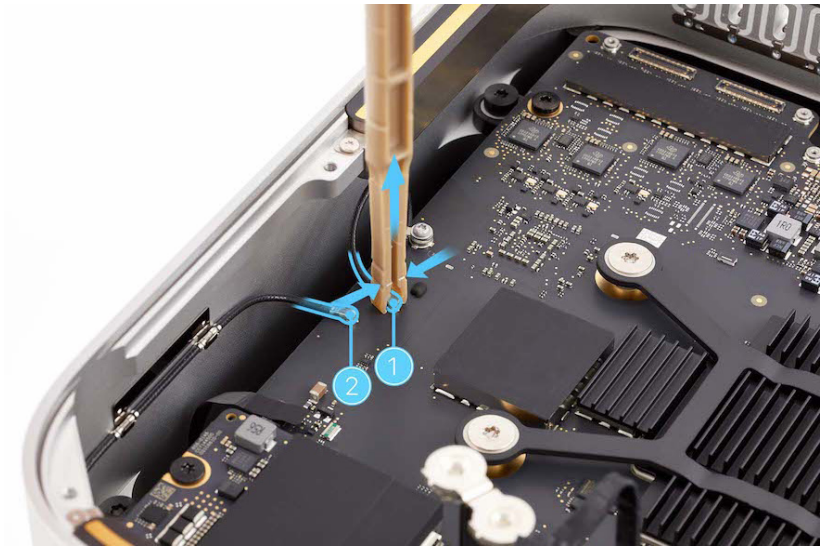
4. Lift antenna 1 from the housing (1). Then secure antenna 1 to the logic board with a piece of Kapton tape (2).

**Caution**

Don't damage the parts on the logic board.

5. Rotate the computer to access the other side as shown. Use the antenna tool to lift the ends of two of the three antenna coaxial cables off the connectors on the logic board.

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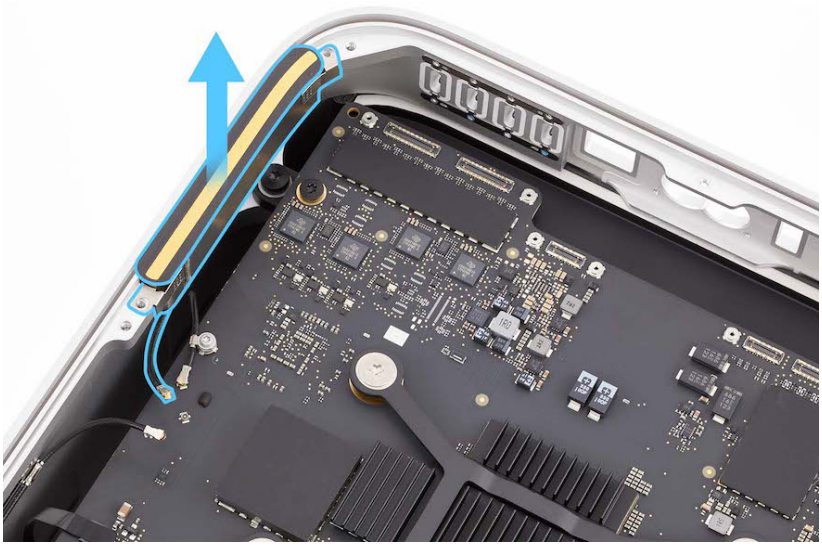
6. Keep the Torx T5 bit in the 10–34 Ncm adjustable torque driver. Set the torque value to 11.5 Ncm.

7. Use the adjustable torque driver and the Torx T5 bit to remove the two T5 screws (923-07101) from antenna 2.

8. Lift antenna 2 out of the housing. Save antenna 2 for reassembly.



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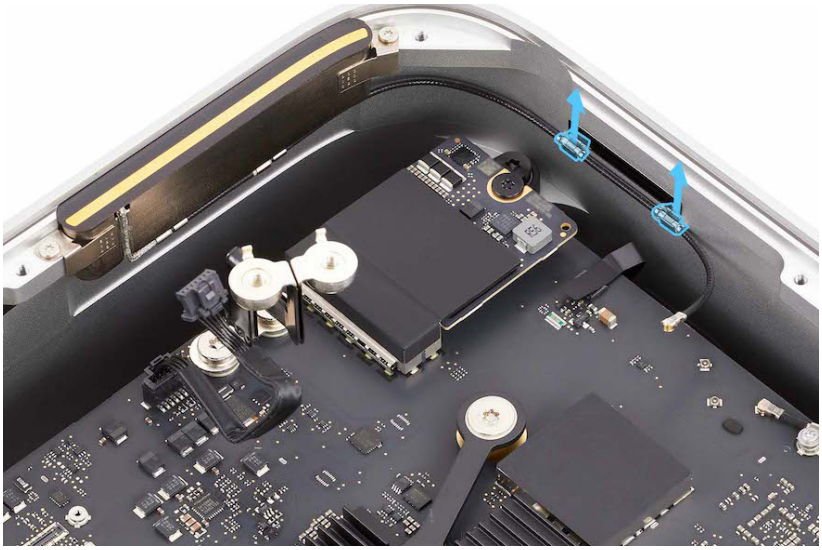
9. Rotate the computer as shown to access antenna 3.

10. Lift the antenna coaxial cable out of the antenna coaxial cable grounding clips in the housing.



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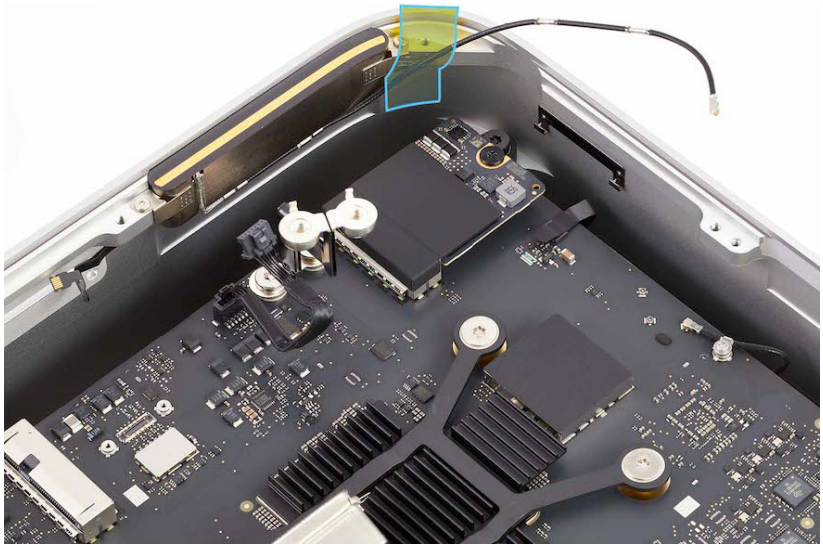
11. Use Kapton tape to secure the antenna coaxial cable to the housing.



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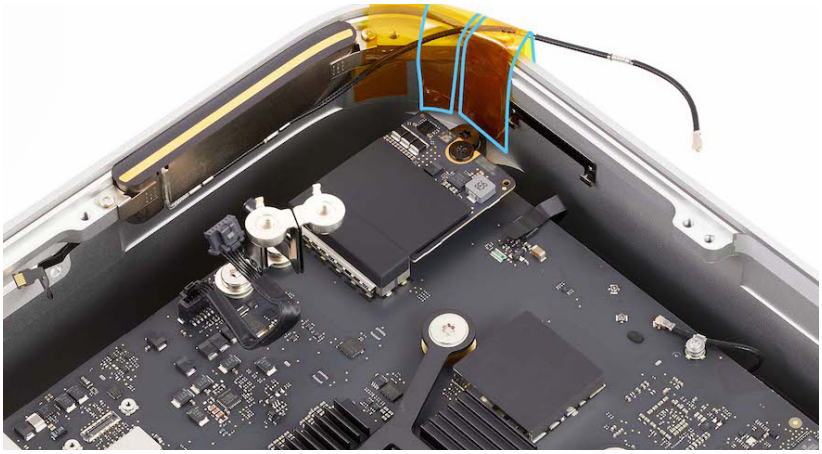
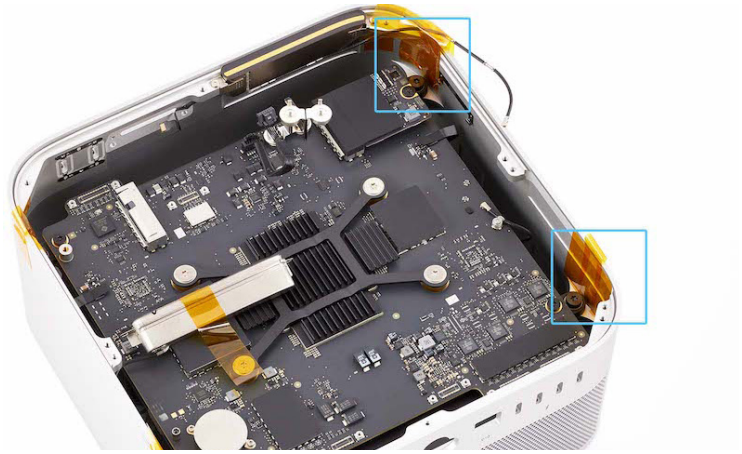
12. Apply Kapton tape inside the housing near the four logic board screws to avoid damaging the housing.





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13. Insert the 10IP bit into the 1.2–3 Nm adjustable torque driver.

14. Use the adjustable torque driver and 10IP bit to remove the four 10IP screws (923-07094) from the logic board.

15. Tilt up the logic board as shown.

    **Note:** The fan is attached to the logic board and can be used to help tilt up the logic board.

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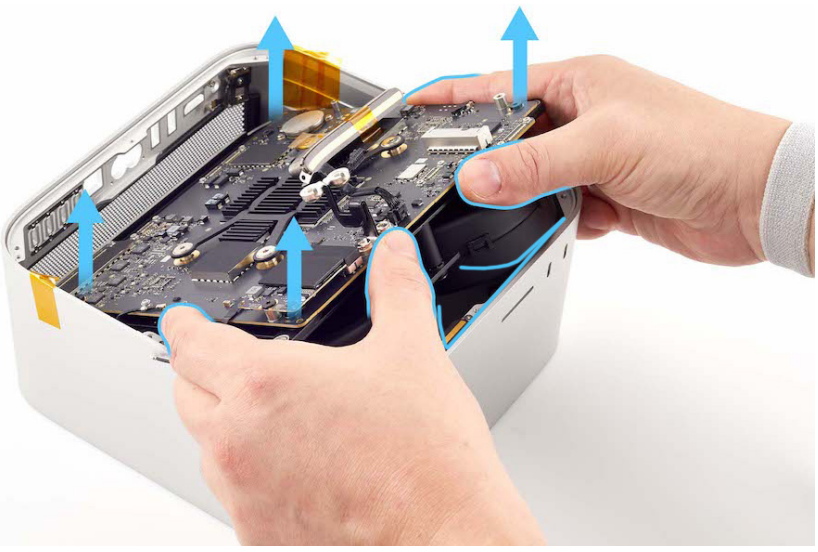
16. Continue to tilt up the logic board. Slide it slightly toward the front of the housing until you see a gap between the back of the housing and the logic board (1). Ensure that the antenna coaxial cable (2) and fan flex cables (3) are free of the housing.

17. Hold the logic board by the edges until the fan is above the edge of the housing. Then support the logic board from under the fan and lift the logic board and fan out of the housing.



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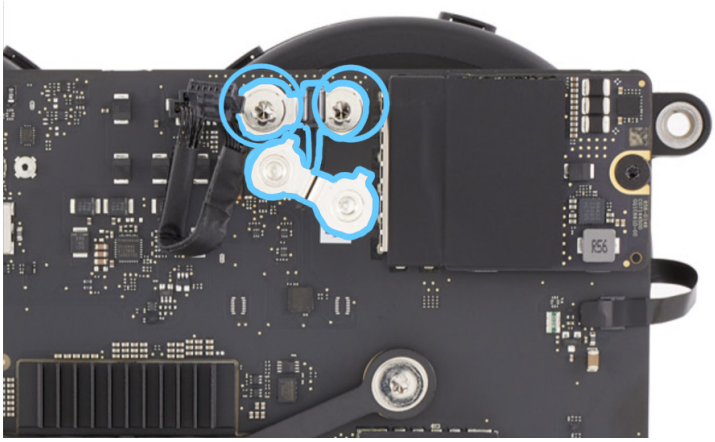
18. If you're removing the logic board as part of another procedure, skip to reassembly step 8. If you're replacing your existing logic board, continue to step 19.

19. Insert the 10IP bit into the 0.3–1.2 Nm adjustable torque driver. Set the torque value to 0.7 Nm.

20. Use the adjustable torque driver and 10IP bit to remove the two 10IP screws (923-07098) from the bus bar.



21. Remove the bus bar and save it for reassembly.

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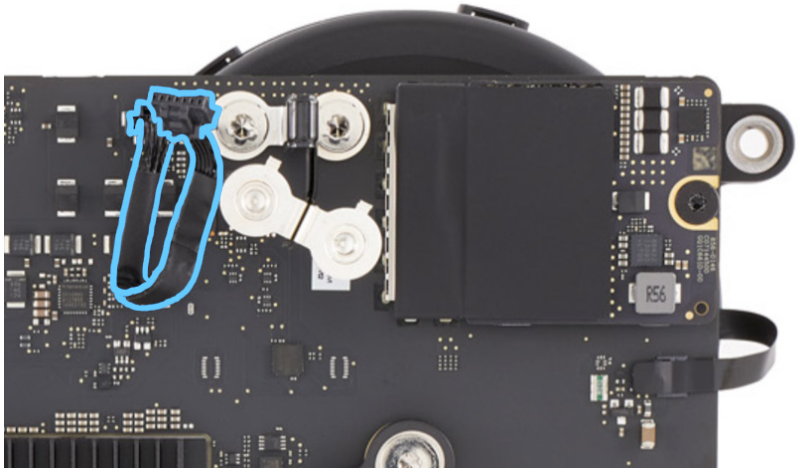
22. Remove the power supply signal cable and save it for reassembly.



23. Remove the SSD modules, fan, and antenna 1 from the logic board and save them for reassembly.

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## Reassembly

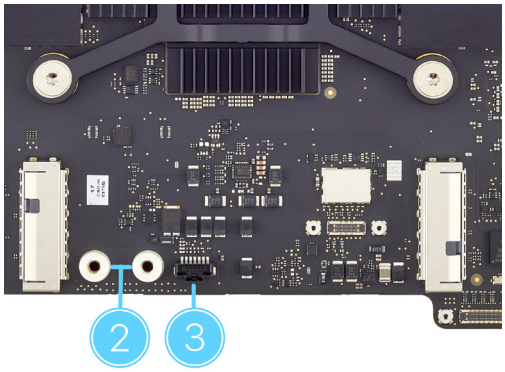
**Important**

If you're installing a replacement logic board, complete all reassembly steps. If you're reinstalling your existing logic board, skip to reassembly step 7.

1. Reinstall antenna 1, fan, and SSD modules onto the replacement logic board.

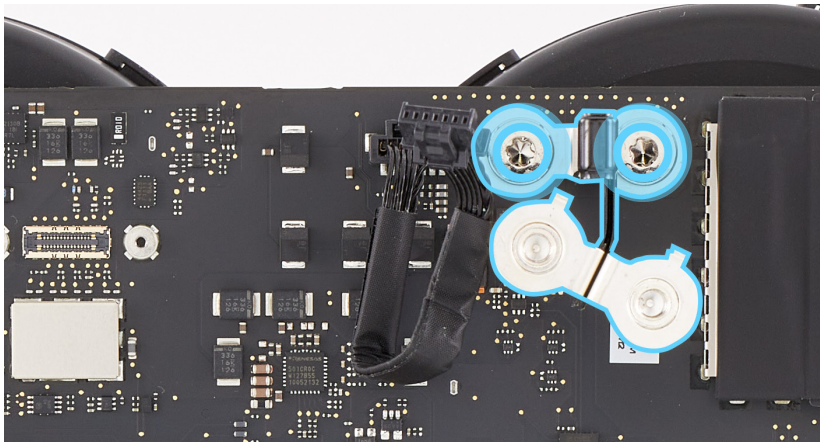
2. Insert the 10IP bit into the 0.3–1.2 Nm adjustable torque driver. Set the torque value to 0.7 Nm.

3. Position the bus bar as shown on the replacement logic board. Align the bottom screw holes on the bus bar (1) with the screw holes on the logic board (2).




4. Use the adjustable torque driver and 10IP bit to reinstall the two 10IP screws (923-07098) into the bus bar and replacement logic board.

5. Insert one end of the power supply signal cable into the connector on the replacement logic board.



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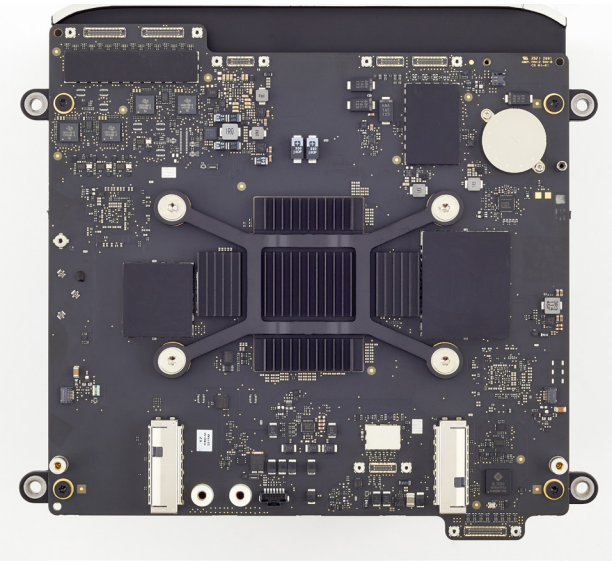
6 Remove the pull tab from under the battery on the replacement logic board.

**Caution**

Failure to remove the pull tab from under the battery may affect the functionality of the computer.



7. Ensure that Kapton tape is applied inside the housing near the four screw mounts for the logic board.

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8. Rotate the housing as shown. Then tilt down the thermal module end of the logic board into the housing as shown.

9. Continue to tilt down the logic board (1) and slide it toward the back of the housing (2). After the fan is below the edge of the housing, slide the logic board fully toward the back of the housing.

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10. Insert the 10IP bit into the 1.2–3 Nm adjustable torque driver. Set the torque value to 2.7 Nm.

11. Use the adjustable torque driver and the 10IP bit to partially reinstall the four 10IP screws (923-07094) into the logic board. Then fully reinstall the four 10IP screws.

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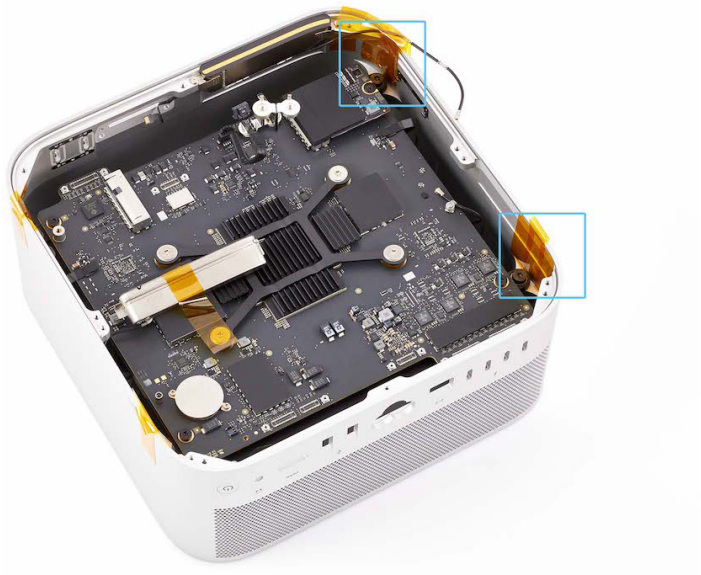
12. Remove the Kapton tape from the housing and the antenna coaxial cable.



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13. Rotate the computer so the front ports are facing you.

14. Remove the Kapton tape securing antenna 1 to the logic board (1). Then position antenna 1 in the housing (2).

15. Insert the Torx T5 bit into the 10–34 Ncm adjustable torque driver. Set the torque driver to 11.5 Ncm.

16. Use the adjustable torque driver and the Torx T5 bit to reinstall the two T5 screws (923-07101) into antenna 1.

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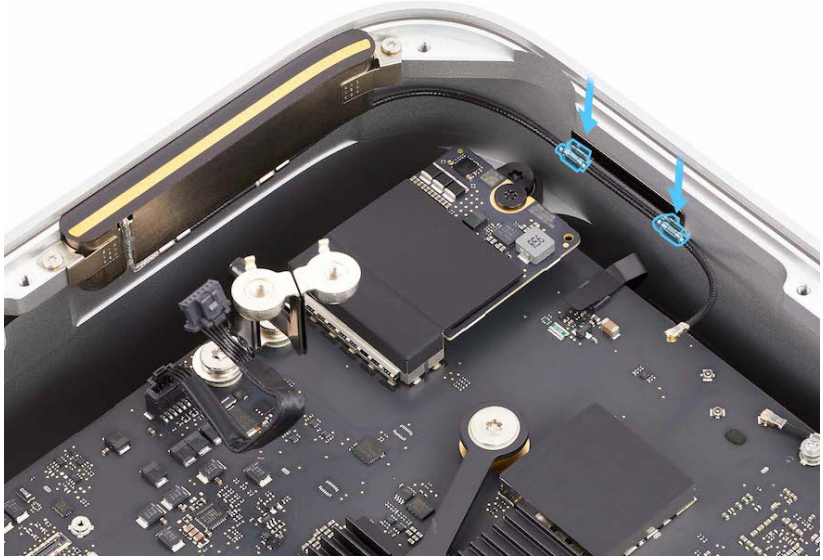
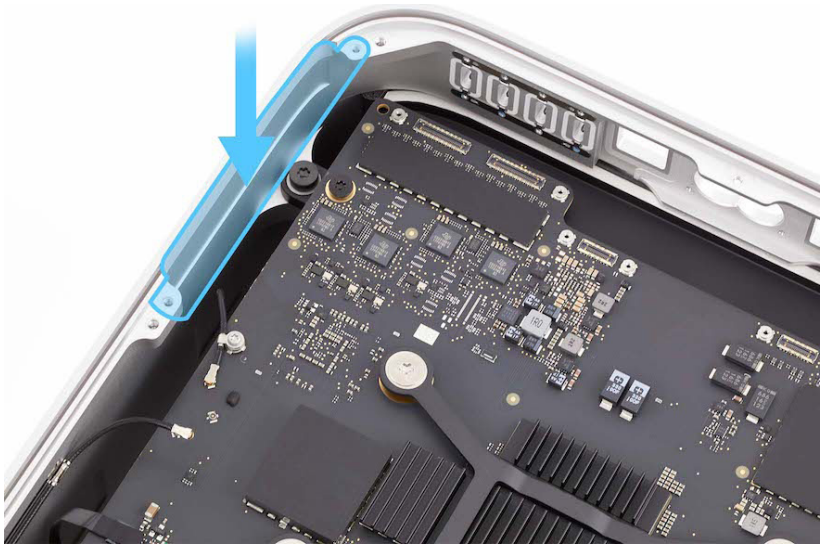
17. Use the black stick to press the antenna coaxial cable into the antenna coaxial cable grounding clips in the housing.



18. Rotate the computer so the front ports are facing you. Position antenna 2 in the housing.



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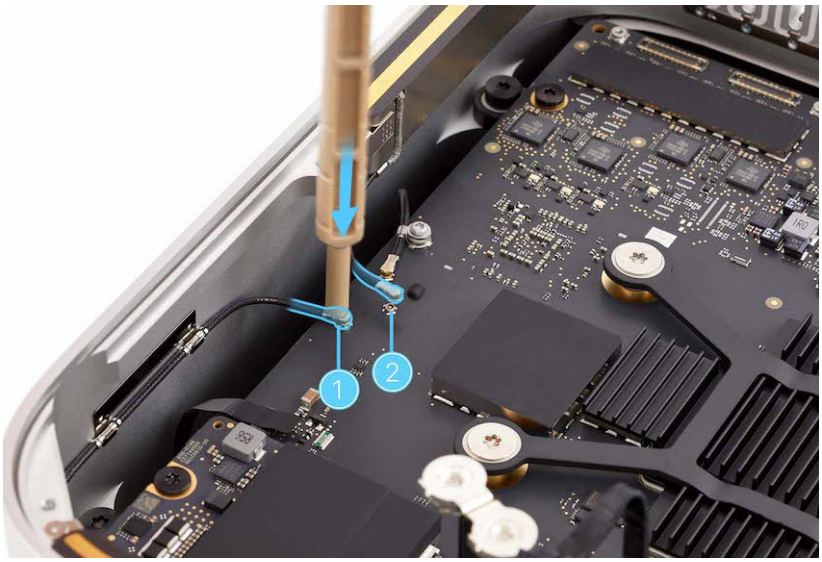
19. Insert the Torx T5 bit into the 10–34 Ncm adjustable torque driver. Set the torque driver to 11.5 Ncm.

20. Use the adjustable torque driver and Torx T5 bit to reinstall the two T5 screws (923-07101) into antenna 2.

21. Use ESD-safe tweezers to position the ends of the two antenna coaxial cables over the connectors.

22. Use the blunt end of the antenna tool to press the ends of the antenna coaxial cables to the connectors in the order shown.

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**Reinstall the following parts to complete reassembly:**

- Power cord port
- Combination input/output board
- Speaker
- Back Thunderbolt 4 ports
- Ethernet board
- SDXC card slot board
- Front USB-C ports
- Internal frame
- Power supply
- Bottom cover

**Caution**

After you've completed all removal and reassembly steps, learn how to initiate the System Configuration process at support.apple.com/self-service-repair.

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# Fan

## Before You Begin

**Remove the following parts before you begin:**

- Bottom cover
- Power supply
- Internal frame
- Front USB-C ports
- SDXC card slot board
- Ethernet board
- Back Thunderbolt 4 ports
- Speaker
- Combination input/output board
- Power cord port
- Logic board

### Tools

- Adjustable torque driver (0.3–1.2 Nm)
- ESD-safe tweezers
- Nylon probe (black stick)
- Torx T10 bit
- Torx T10 screwdriver

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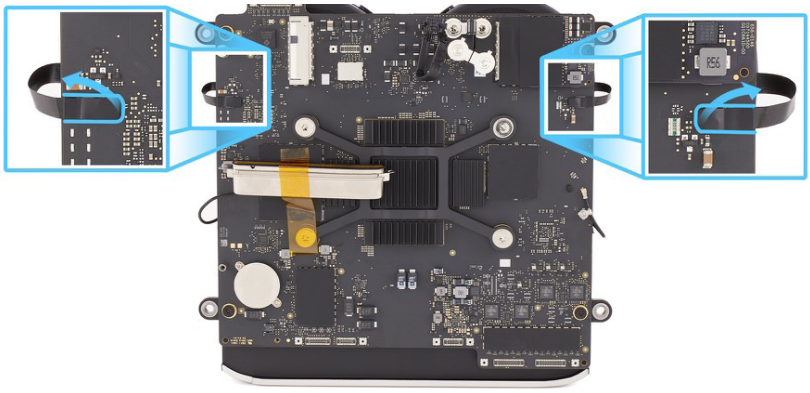
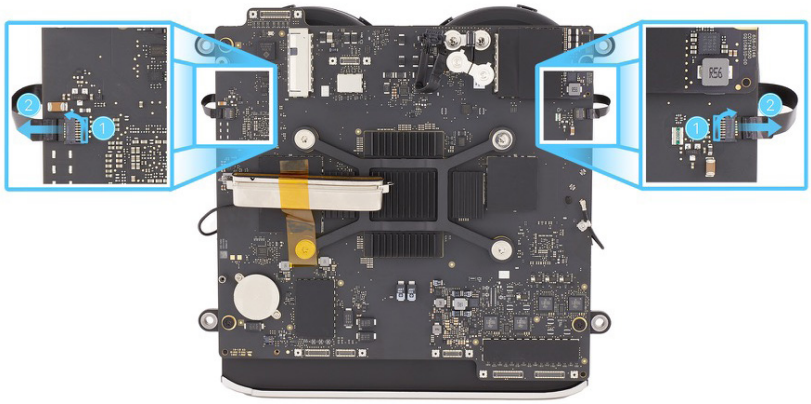
## Removal

1. Stand the logic board on the thermal module end as shown.



2. Use ESD-safe tweezers to peel back the polyester film tabs on the ends of the two fan flex cables.

3. Use the black stick to flip up the locking levers on the two fan connectors (1). Then slide the ends of the two fan flex cables out of the connectors (2).

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4. Rotate the logic board to access the other side. Use the T10 screwdriver to remove the three T10 screws (923-0333) from the fan.

5. Lift the fan off the thermal module.

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## Reassembly

1. Position the fan on the thermal module. Ensure that the bottom edge of the fan is behind the foam gasket on the thermal module.

2. Insert the Torx T10 bit into the 0.3–1.2 Nm adjustable torque driver. Set the torque value to 0.95 Nm.

3. Use the adjustable torque driver and Torx T10 bit to reinstall the three T10 screws (923-0333) into the fan.

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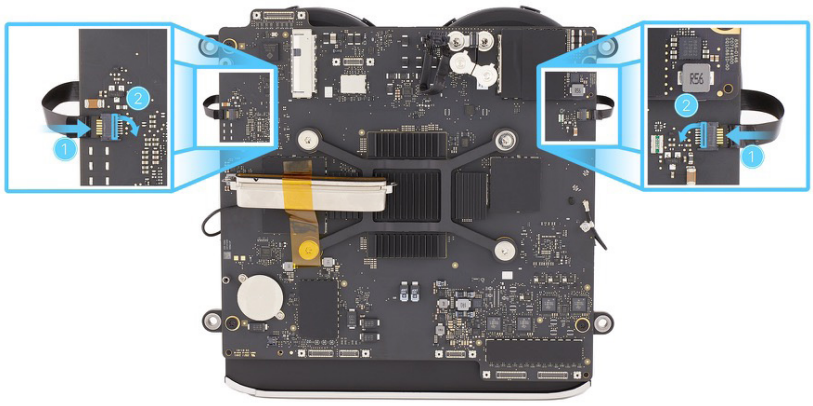
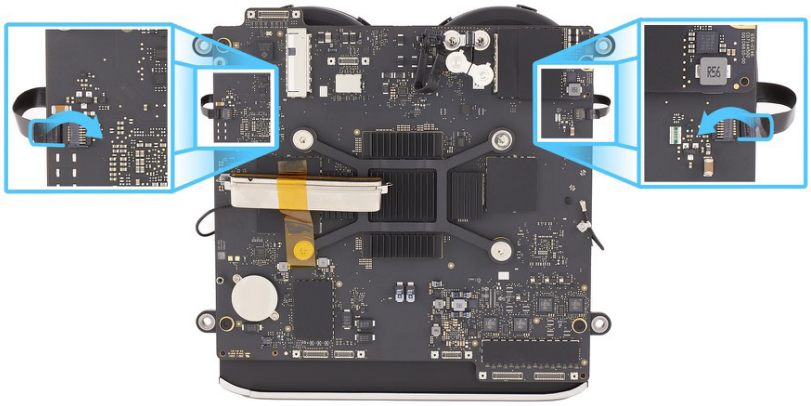
4. Rotate the logic board to access the other side.

5. Slide the ends of the two fan flex cables into the connectors (1). Then flip down the locking levers (2).




6. Press the polyester film tabs over the ends of the two fan flex cables.



**Reinstall the following parts to complete reassembly:**

- Logic board
- Power cord port
- Combination input/output board
- Speaker
- Back Thunderbolt 4 ports
- Ethernet board
- SDXC card slot board
- Front USB-C ports
- Internal frame
- Power supply
- Bottom cover

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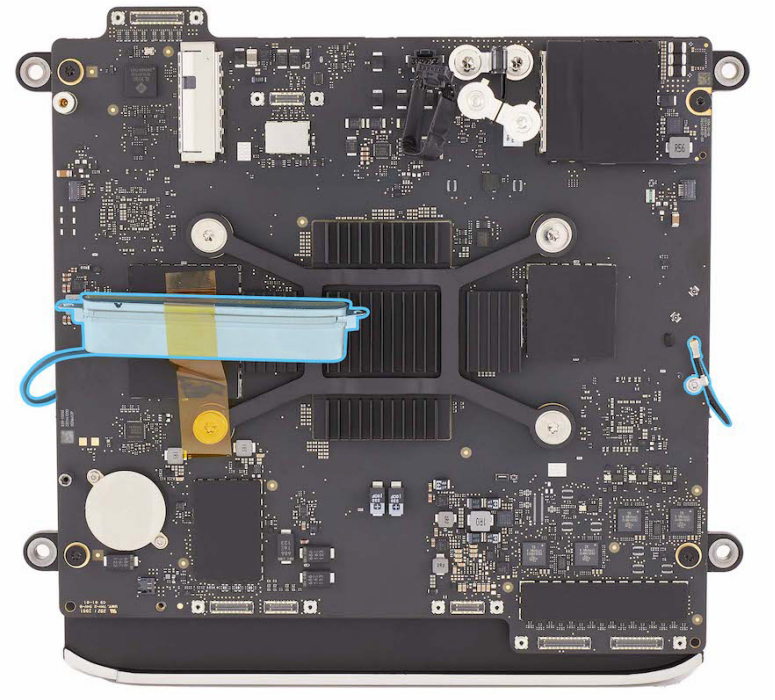
# Antenna 1

## Before You Begin

**Remove the following parts before you begin:**

- Bottom cover
- Power supply
- Internal frame
- Front USB-C ports
- SDXC card slot board
- Ethernet board
- Back Thunderbolt 4 ports
- Speaker
- Combination input/output board
- Power cord port
- Logic board
- Fan



### Tools

- Adjustable torque driver (10–34 Ncm)
- Antenna tool
- Kapton tape
- Torx T5 screwdriver
- Torx T6 bit
- Torx T6 screwdriver

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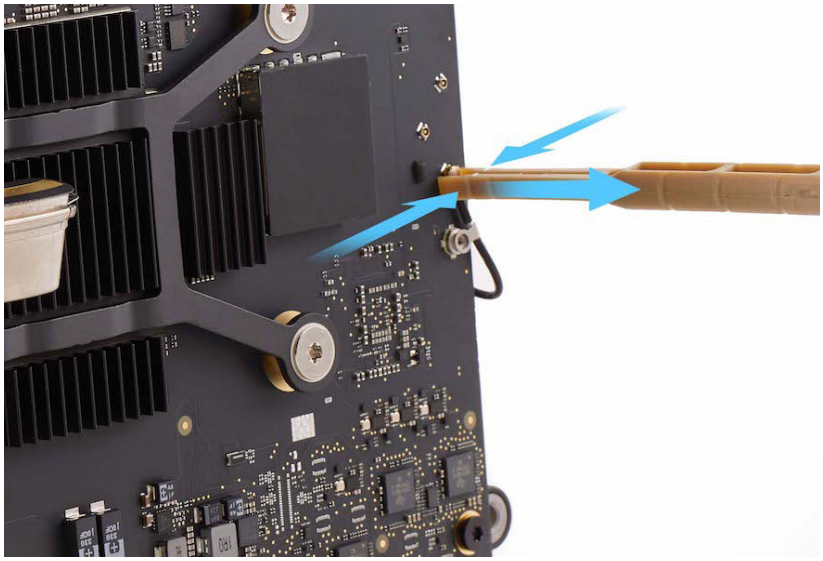
## Removal

1. Stand the logic board on the thermal module end as shown.

2. Use the T6 screwdriver to remove the T6 screw (923-03034) from the antenna coaxial cable grounding clip. Then gently peel the Kapton tape from antenna 1 and the logic board.

3. Use the antenna tool to lift the end of the antenna coaxial cable off the connector.



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4. Rotate the logic board to access the other side. Use the T5 screwdriver to remove the eight T5 screws (923-07102) from the antenna coaxial cable routing clips.

5. Remove antenna 1 from the logic board.

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## Reassembly

1. Position antenna 1 as shown. Use the T5 screwdriver to reinstall the eight T5 screws (923-07102) to secure the antenna coaxial cable routing clips to the logic board.

2. Rotate the logic board to access the other side.

3. Gently secure antenna 1 to the logic board with a piece of Kapton tape.

4. Insert the Torx T6 bit into the 10–34 Ncm adjustable torque driver. Set the torque value to 14.5 Ncm.

5. Use the adjustable torque driver and Torx T6 bit to reinstall the T6 screw (923-03034) into the antenna coaxial cable grounding clip.

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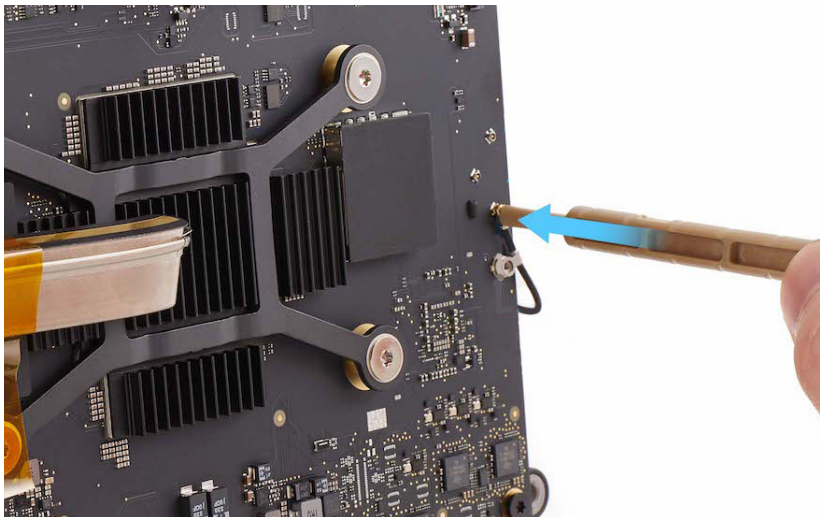
6. Use the blunt end of the antenna tool to press the end of the antenna coaxial cable to the connector.



**Reinstall the following parts to complete reassembly:**

- Fan
- Logic board
- Power cord port
- Combination input/output board
- Speaker
- Back Thunderbolt 4 ports
- Ethernet board
- SDXC card slot board
- Front USB-C ports
- Internal frame
- Power supply
- Bottom cover

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# Housing

## Before You Begin

**Remove the following parts before you begin:**

- Bottom cover
- Power supply
- Internal frame
- Antenna 2
- Antenna 3
- Front USB-C ports
- SDXC card slot board
- Ethernet board
- Back Thunderbolt 4 ports
- Speaker
- Combination input/output board
- Power cord port
- Logic board

### Tools

- No tools are required for this procedure.

**Note:** You can remove the logic board with antenna 1, fan, battery, and SSD modules installed.

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## Removal

There are no additional removal steps. The housing includes the following parts:

- Power button (1)
- Status indicator light (2).

**Note:** The power button can be replaced separately.

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## Reassembly

### Reinstall the following parts to complete reassembly:

- Logic board
- Power cord port
- Combination input/output board
- Speaker
- Back Thunderbolt 4 ports
- Ethernet board
- SDXC card slot board
- Front USB-C ports
- Antenna 3
- Antenna 2
- Internal frame
- Power supply
- Bottom cover

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